VOL. XXII NEW YORK—THURSDAY, JANUARY 27, 1910—CHICAGO No. 4

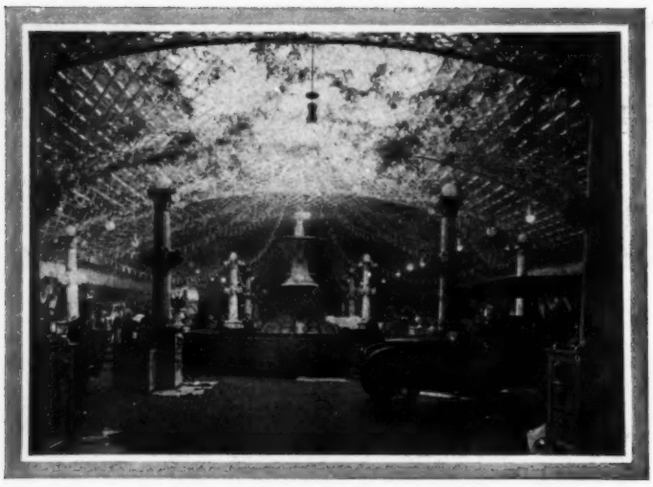
THE AUTOMOBILE

DETROIT SHOW

OPENED UNDER AUSPICES of DETROIT DEALERS' ASSOCIATION

DETROIT, Jan. 26—Wayne Hotel Gardens on Monday evening, when the Detroit Show opened, presented a scene of activity which has been described as fully representative of the automobile situation in general as it obtains at the heart of the automobile industry. The Detroit Automobile Dealers' Association is the moving spirit in this demonstration in a large way, and it has proven by the results already realized that the 33,000 square feet of available space in the Garden is far from half enough for the purpose.

When the scheme of decoration greeted the eyes of the spectators last year the sentiments voiced were in substance that the last word was said. Sculptor Wagner evidently failed to consider last year's effort in the light of finality, for in all truth the decorative scheme this year is a pronounced, artistic innovation. In a word, the decorative idea comprises a Venetian Garden for the lower floor, and trellis-work through which is entwined Southern smilax, and in harmony with this artistic atmosphere, a myriad of canary birds in golden cages which are placed haphazard, as it were, completes the plan.



View Taken at Opening Time Showing Confusion

Approach to the upper floor is by means of a grand stairway, flanked at its base by two figures of "The Motor Girl" in heroic size, sharing the pleasant task of holding a silken banner between them, indicating the way to the hall above. As the visitor arrives at the head of the grand stairway, "Science," and "Labor" as represented by appropriate statuary extend greeting, and a little further on a graceful arch supports a scroll upon which is blazoned the single word "Progress" brought into bold relief by the proper use of electric lights. The seal of the D. A. D. A. occupies space upon the hangings at the rear of the platform, and the effect from the art point of view is appropriately completed by a trellis-like arrangement of white ropes, scattered through which are mammoth roses and a myriad of electric lights.

Despite the Herculean task, the Garden was in excellent presence on Monday night, agreeable to the scheduled time of opening, and the committee in charge is to be congratulated for having thus disposed of the work in hand. Much of the credit for the excellent work done must necessarily be sub-divided, but Manager John Gillespie, who labored indefatigably from the instant he was chosen for the position, maintained unswerving interest, and displayed an adequate measure of ingenuity resulting in the mastery of each of the intricate problems.

President George E. Lane, Secretary Robert K. Davis, Treasurer J. H. Brady, and Directors George Grand and John P. Schneider, each in his own way worked untiringly in the cause, and as pioneers in the Detroit arena occupy positions of distinction. That the show will prove to be a fitting success, is now well assured, and in view of this splendid effort on the part of Detroit's most capable automobile enthusiasts, it may not be out of place to digress for a pace, and by some prosaic means at hand indicate in a fair measure the material backing which is behind the committee. As representative of the Detroit automobile industry alone, the Detroit show would be one of stupendous proportions. During the coming year it is estimated that Detroit will build half of the country's automobile product.

Looking through the mist which obscures the real situation, rather than to be dazzled by the extreme splendor of the automobiles which are on parade at the Detroit Show, discloses a situation of the greatest magnitude, and makes comprehension play the part of a dwarf. If some one phase of the great main story is spread out, it may be that it will retain enough of simplicity to enable one to grasp it, and that it will glisten on the polished surfaces of the plate of imagination, and leave the individual in pleasant reverie, is the main expectation. In the building of 100,000 automobiles, which is Detroit's estimate, besides the structures, real estate on which to plant them, and the what-not demanded, there are machine tools—the last of them would span a mile if strung out, after the 90 per cent are disposed of.

Some Exhibitors Were Shrewd Enough to Get in Early

REFLECTING THE MACHINE TOOL SITUATION

To build 100,000 automobiles in a single year, requires the dextrous use of the following list of machine tools during a period of 3,000 hours, which is 300 working days of ten hours each.

Number of Units	Types of Tools Required
333	28″ Gisholt lathes.
666	24″ Gisholt lathes.
666	21″ Gisholt lathes.
9,990	14″ x 6′ engine lathes.
3,960	18″ x 8′ engine lathes.
1,332	20″ x 10′ engine lathes.
666	24″ x 12′ engine lathes.
333	28″ x 14′ engine lathes.
666	30″ x 14′ engine lathes.
333	36″ x 18′ engine lathes.
333	40″ Bullard mills.
999	horizontal boring machines.
666	cylinder boring machines.
999	No. 5 Becker-Brainard vertical millers.
999	No. 6 Becker-Brainard vertical millers.
666	72″ Becker-Brainard horizontal millers.
3,996	No. 2 Cincinnati millers.
666	No. 2 Cincinnati millers.
1,998	Cincinnati hand millers.

ROLL OF HONOR

Cars	Represented by
American	Montgomery Sales Company
American Simplex	Grant Brothers
Anhut	Anhut-Robinson Auto Sales Company
Babcock Electric	Seidler & Miner Auto Company
Baker Electric	J. P. Schneider
Brush	Brush Runabout Company
Buick	Buick Motor Company
Cadillac	Cadillac Motor Car Company
Cartercar	Cartercar Company
Chalmers-Detroit	Grant Brothers
Demot	Harper-Aldrich Auto Company
De Tamble	Neil-Kitchell Motor Sales Company
Detroit Electric	Anderson Carriage Company
Detroit-Dearborn	Detroit-Dearborn Motor Company
Elmore	Fee-Bock Auto Company
E-M-F	Cunningham Auto Company
Everitt	Security Auto Company
Flanders	Cunningham Auto Company
Ford	Ford Motor Company
Grabowsky	Auto Commercial Company
Haynes	Broadway Auto Company
Herreshoff	Herreshoff Motor Company
Hudson	J. H. Brady Auto Sales Company
Hupmobile	R. W. Keeler
Jackson	Seidler & Miner Auto Company
Keystone	Detroit Motor Sales Company
KisselKar	P. W. Schulte Garage Company
K-R-I-T	Gilmour & Fear Auto Company
Lambert	J. B. McIntosh Company
Lozier	Lozier-Detroit Sales Company
Maxwell	Maxwell-Briscoe-McLeod Company
Metz	Metz Plan Company

666	Special crankshaft machines.
2,664	30" radial drills.
1,334	48" radial drills.
3,996	vertical drill presses.
3,333	sensitive drills.
1,998	12" x 40" universal grinders.
2,664	Pratt & Whitney screw machines (1-2 x 18).
1,998	Pratt & Whitney screw machines (1 x 12).
1,332	Pratt & Whitney screw machines (5-8 x 6).
1,322	Brown & Sharpe automatic screw machines (1 x 10).
1,332	Jones & Lamson L. H. screw machines.
666	flexible grinders.
1,998	14" flexible grinders.
100	sand blast equipments.
666	compressed air riveters.
1,332	compressed air riveters.
1,000	miscellaneous small and special tools.
60,355	Machine tools of all kinds.

POWER REQUIRED AND COST PER ANNUM

Considering 60,000 machine tools as being the requirement in the process of making 100,000 automobiles, this means that a power plant will have to be available, capable of delivering 120,000 horsepower, which, per year, is worth, or better yet, will cost $3,600,000, the same to be divisioned off in labor, coal, oil, waste and supplies. This power plant will be at an enormous first cost for buildings, boilers, engines, auxiliaries and dynamos. In the distribution of the power to the machine tools, if an electrical system is utilized, the motors will foot up to $10,800,000, which valuation does not include fittings and installing.

In a general way, not counting pennies, the summary of this cost including machine tools, shafting, belting, electric motors, power plant, and the one hundred and one things which were not mentioned, will foot up to the enormous sum of $84,755,000. Real estate, buildings and kindred costs are not included. This total includes the cost of running the power plant for the year, and, adding depreciation to this, which will be 10 per cent. of the cost of the equipment less the cost of operation, the amount which will have to be charged against the automobiles as "overhead" on account of machine tools, power, depreciation and like factors, will be $11,715,500, or $117 per automobile.

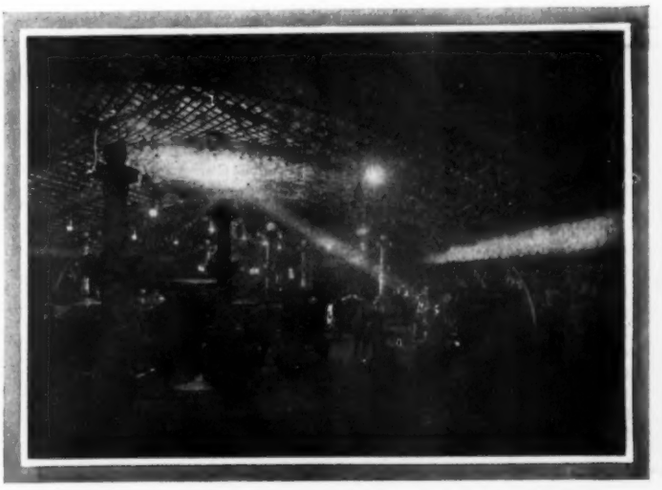
That this view is far from the whole story, is proven by the mere statement that interest on the investment has not been referred to. This item alone, on a 6 per cent. basis, would be $4,866,930, which is $48.66 per automobile produced. Let us not pursue this trend further; as it stands, it is an insight into the vastness of the automobile industry as it obtains in Detroit. In reading about, or glancing over the automobiles at the show, it will add some to the interest, it is believed, to realize that the coming of the automobile has brought prosperity into a host of homes, for, as will be readily appreciated, labor enters into the machine tools, power plant, electrical equipment and the many other things, as well as into the production of the automobiles while they are being made. Let us end by saying that the man who buys an automobile puts bread into the mouths of the children of the men who work in the mines, railroad the materials, and build the machine tools as well as those who make the automobiles, and in this way, according to competent estimates, $500,000,000 in round numbers, change hands per year, and that, too, on the puny basis on which the automobile now rests, puny, it is said, which is in the light of a future of which the show at Detroit is as a cuckoo egg in a robin's nest.

In Detroit the natives claim that it is to be the dominant center in the building of automobiles in the future as it seems to be at the present time. The city offers every inducement to trade, and from the details of the latest acquisition it looks as if Detroit is to have another million dollar automobile plant, as a result of negotiations that were completed to-day. Official confirmation of the announcement in these columns some weeks ago that the Lozier Motor Company would establish a plant in Detroit is made by President Harry Lozier, who is there to attend the local show and also for the purpose of arranging the final details in what will mean the addition of another immense plant to the local motor colony.

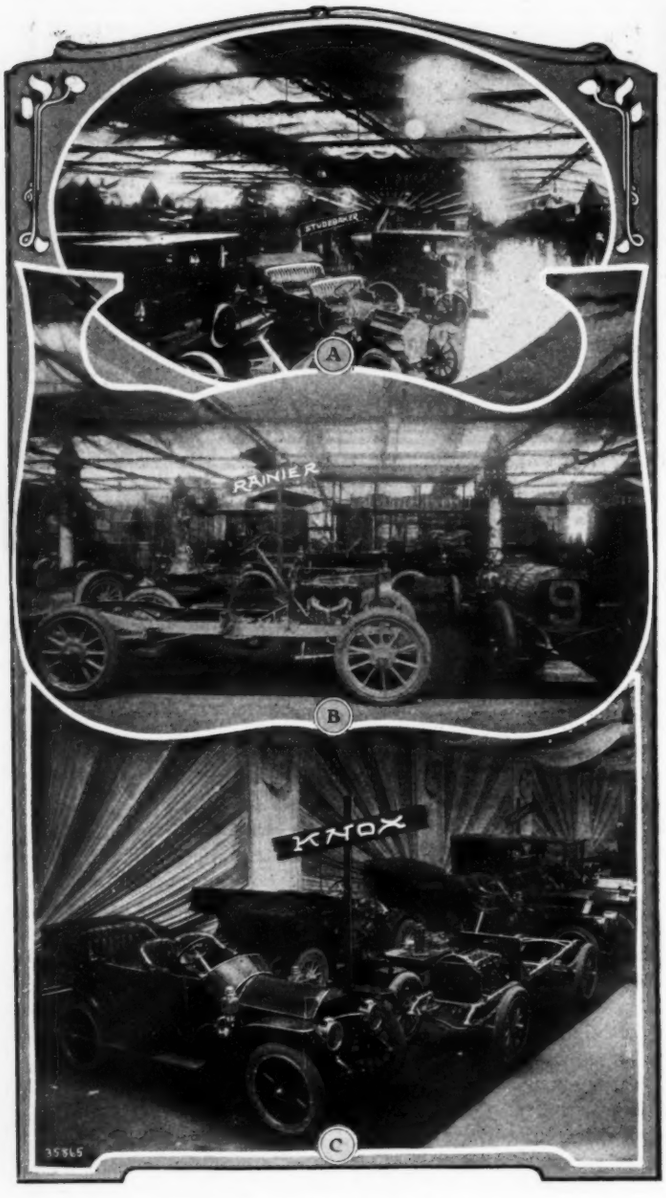
ROLL OF HONOR

Cars	Represented by
Michigan	Michigan Steam Motor Company
Mitchell	Gilmour & Fear Auto Company
Oakland	Michigan Motor Sales Company
Oldsmobile	Olds Motor Works
Overland	Fee-Bock Auto Company
Packard	Standard Auto Company
Paige-Detroit	Detroit Motor Sales Company
Palmer-Singer	Bemb Auto Sales Company
Parry	Nell-Kitchell Motor Sales Company
Paterson	W. A. Paterson Company
Peerless	J. H. Brady Auto Sales Company
Pierce-Arrow	J. P. Schneider
Pope-Hartford	J. H. Brady Auto Sales Company
Rapid	Rapid Motor Vehicle Company
Rauch & Lang	W. F. V. Neumann
Regal	Regal Auto Sales Company
Reo	Gillespie Auto Sales Company
Stanley	Auto Commercial Company
Stearns	Palmer Auto Company
Stevens-Duryea	J. P. Schneider
Stoddard-Dayton	W. F. V. Neumann
Studebaker	Cunningham Auto Company
Templeton-Dubrie	Templeton-Dubrie Auto Company
Thomas	Gillespie Auto Sales Company
Van Dyke	Van Dyke Construction Company
Warren-Detroit	Detroit Motor Sales Company
Welch-Detroit	Welch-Detroit Auto Company
Welch-Pontiac	Michigan Motor Sales Company
White	Postal & Doherty Company
Whiting	Flint Wagon Works
Winton	Winton Motor Carriage Company
Woods Electric	Fee-Bock Auto Company

Fixing Up the Exhibit of One of Detroit's Finest



A Partial Vista of the Complete Interior Shows Beauty



A—View of the second week of the Philadelphia automobile show, with the Studebaker exhibit occupying the foreground

B—Rainier exhibit, with a chassis and the No. 9 racer which scored at Brighton Beach last Summer in the 24-hour races

C—Knox chassis, also showing the latest idea in body work of this veteran Bay Stater, following the torpedo style

EXHIBITORS AT PHILADELPHIA, SECOND WEEK

Gasoline Pleasure Vehicle Section

Autocar	Autocar Company.
Cole	Stoyle-Vogel Auto Company.
E-M-F	E-M-F and Flanders Agency.
Empire	Motor Supplies Company.
Flanders	E-M-F and Flanders Agency.
Halladay	Krause Motor Car Company.
Haynes	Haynes Automobile Company.
Imperial	Imperial Auto Company.
Kline Kar	B. C. K. Motor Car Company.
Knox	North Philadelphia Auto Station.
Otto	Otto Gas Engine Works.
Pullman	Longstreth Motor Car Company.
Rainier	Collings Carriage Company.
Springfield	Springfield Motor Car Company.
Studebaker	Studebaker Brothers Company.

Quaker City Show

PHILADELPHIA, Jan. 26—The double-show idea certainly works wonders in providing adequate space for an excessive number of exhibitors, but it also makes trouble for the unfortunate showmen who are forced to clear out one set of cars and install another in the 36-hour interval. Hardly had the first week come to an end at 11 o'clock Saturday night when a hundred khaki-clad laborers entered upon the scene and began their task. First it was necessary to move out the original exhibits; then the spaces must be rearranged and the signs changed, and finally the gathering of pleasure cars, commercials, electrics, and accessories which make up the last half had to be installed.

Fourteen exhibitors of pleasure cars form the nucleus of the second installment. Four electric pleasure cars will be on hand, and eight commercial cars, part gasoline and some electric. Three motorcycle exhibits and twenty-five or so of tires, oil and other accessories will fill up the gaps. This week will witness the official debut here of the Flanders, Halladay, Empire, Otto, Springfield and Cole, Detroit electric, Crane & Breed, Martin, and Packard commercial vehicles, not to mention the reappearance of the Rainier, after two years' absence.

Last week's show was greatly handicapped by the weather, which could not have been worse if it had been especially prepared with a view to keeping everyone indoors. Snow, rain, sleet and slush were supreme for four of the six days. On Wednesday there was a temporary let-up, and then the crowd poured into the Armory in such numbers as to create a new attendance record. Thursday was a "dollar day," which fact, with a few more exhibitions of assorted bad weather, kept the crowd down; but that was the best business day of the week.

It is from a business standpoint that the first week will go down in the records of the Trade Association, whatever the box office figures may be. All of the thirty exhibitors who were doing business last week scored liberally in the matter of sales. Maxwell, Ford, Locomobile, Mitchell, Studebaker and other concerns which use Philadelphia as a distributing center reported a surprisingly large number of cars actually sold, as well as cars placed with the agents. The present week promises to be equally good in this respect.

Of the several local productions which naturally occupy the center of the stage, the only one to make its appearance at the first week was the Bergdoll "30," built by the Bergdoll Motor Car Company. This is a light four-cylinder car fitted, on order, with either touring, baby tonneau or runabout bodies. The motor cylinders are in a block casting, and are 4 inches bore by 4 1-2 inches stroke. Inlet valves, of generous dimensions, are in the centers of the cylinder heads, with exhaust valves in pockets at the left side. The crankshaft, very short and stiff, is carried on two ball bearings.

Motor, clutch and change-gear are all united in a single unit, the crankshaft being formed with a rear extension which surrounds the flywheel and meets a similar extension from the gear case. The clutch is a multiple disc, and the change-gear a three-speed selective, in which a good feature is the milling of the main shaft to form four splines. This motor unit is mounted on a running gear of 112 inches wheelbase, with 34 by 3 1-2-inch tires. Final drive is by a shaft enclosed in a torsion tube, with a single universal joint. A taxicab will be built on the same chassis, the only change of note being the use of 32 by 4-inch tires.

Two more native sons will come in for their share of attention this week, these being the Kline Kar and the Otto. The

Opened Second Section

Kline Kar, which, to be accurate, hails from York, Pa., made its appearance sufficiently early in the season to become quite well known. Two models of pleasure cars are made, a four and a six. Both have cylinders of 4 3-32 inches bore by 5-inch stroke, cast separately. The individual castings, however, are made with large core openings in the front and back of the water-jackets, and are bolted together with these openings registering, to form a continuous chamber for the water. The front of the first and the rear of the last cylinder are, of course, closed by plates. The appearance of the whole is that of a block casting.

For the rest the cars follow standard design. A cone clutch, three-speed selective gear, with annular ball bearings and an enclosed shaft with a single universal joint, complete the transmission of power. The rear axle is semi-floating, also with ball bearings, and the front axle is an I-beam.

The four-cylinder model, rated at 26.8 horsepower by the A. L. A. M. formula, has a 109-inch wheelbase with 34 by 3 1-2-inch tires. The six-cylinder, rated at 40.2 horsepower, is mounted on a 122-inch wheelbase, with 36 by 4-inch tires. For those who desire a speed car, a model known as the "Meteor" has been brought out, in which the six-cylinder motor is mounted on a shorter chassis, with a racing body.

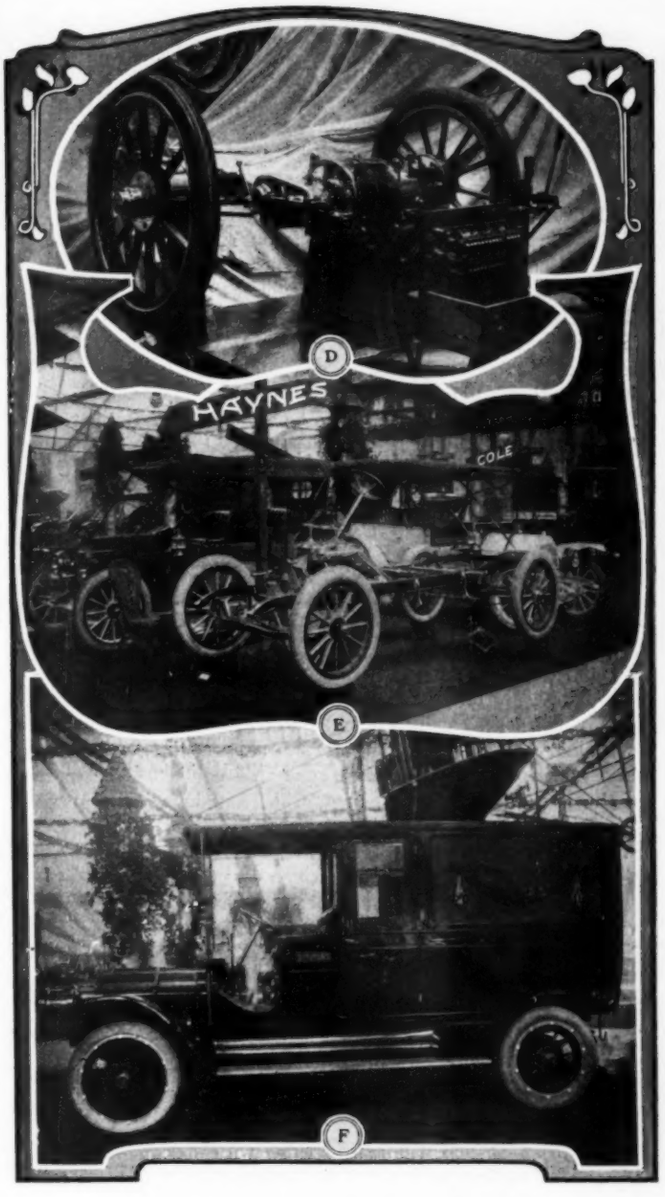
This company also has a light commercial car, which can be fitted with either a stake truck, an express, delivery or wagonette body. The motor is a two-cylinder horizontal opposed, water-cooled by thermo-siphon circulation, and drives through a two-speed planetary gear and side chains. The standard wheelbase is 86 inches, and the tires are 36 by 3-inch solid.

The Otto Gas Engine Works, a firm known all over the country for the excellence of its stationary engines, has entered the automobile field with a four-cylinder car of medium size, which seems likely to still further increase its reputation. The motor follows the very latest practice in having a slightly longer bore in proportion to its stroke than is customary, the figures being 4 3-8 by 5 1-4 inches. Cylinders are cast in pairs, with all valves on the left side. A true honeycomb radiator, with fan, and a centrifugal pump mounted on the right side of the motor, take care of the cooling. The Bosch dual ignition system is used, the magneto being driven from the rear end of the pump shaft. The motor and its accessories are mounted on a sub-frame hung from the front and middle cross-pieces of the main frame.

The change-gear, a three-speed selective, is made a unit with the rear axle. The torsion tube which encloses the drive shaft is supported from the frame cross-member at its forward end by an original linkage, which has the effect of a ball or universal joint, allowing it to swing in any direction, while at the same time it is positively held, and all strains are taken off the drive shaft. In addition the rear axle is provided with two radius rods.

The Otto is made in three styles, a full tonneau, baby tonneau and runabout, with tires 34 by 4, 32 by 3 1-2 and 34 by 3 1-2, respectively. The weights average about 2,000 pounds. The wheelbase on all is 123 inches. The cars are all hung low, and this, combined with their long wheelbase, gives them a rakish appearance which many autoists find attractive.

Although Philadelphia has never claimed to be in the front rank as an automobile building city, especially now that outputs are rated in the thousands and tens of thousands, nevertheless, the old Quaker City has no reason to be ashamed of its product. With the addition of these newcomers it will attain still further prominence in the automobile world.



D—Novel rear axle construction of the Waverley electric, in which the drive is by a shaft parallel to the axle itself

E—Haynes stand, with a stripped chassis in the foreground, and touring models disposed about as a scenic setting

F—Commercial car brought out by Crane & Breed, a newcomer to the trade; a Curtiss aeroplane appears overhead

EXHIBITORS AT PHILADELPHIA, SECOND WEEK

Commercial Vehicle Section

Autocar	Autocar Company.
Commercial	Commercial Truck Company
Crane & Breed	Collings Carriage Company.
Kline Kar	B. C. K. Motor Car Company.
Knox	North Philadelphia Auto Station.
Manhattan	Mack Bros. Motor Car Company.
Martin	Martin Carriage Company.
Packard	Packard Motor Car Company.
Studebaker	Studebaker Brothers Company.

Electric Vehicle Section

Detroit	J. C. Parker & Son Company.
Studebaker	Studebaker Brothers Company
Waverley	Collings Carriage Company.
Woods	J. C. Bartlett.

LICENSED ASSOCIATION FAST ASSUMING DUE PROPORTIONS

FOREIGNERS TAKING OUT LICENSES UNDER SELDEN PATENT

MANY MAKERS STRUGGLING WITH A COMPLICATED SITUATION

THE latest understanding in relation to licensed relations of the various companies is reflected in the licensing of the Lancia Import Company, under a special form of contract, to import and sell automobiles in the United States.

From present appearances, considering the most authentic information available, it seems that the A. L. A. M. proposes to be liberal in its dealings with companies which can show that they are responsible, and especially if they have vested rights. The newcomers, however, seem to be anxious to know just where they are at, and, from all that can be learned, this is the question of the hour.

To sum up, taking the situation as it can reasonably stand discussion of, the makers of automobiles in America who were actually engaged in the manufacture of cars when the court decision was rendered, have nothing to fear for the future, excepting that they have to make terms; that the terms will be liberal and just is assured. Importers, if they were actually engaged in the trade before the date of the decision, will be able to make terms just as the Lancia concern has succeeded in doing.

Those who are shivering on the outside, and are likely to have a little trouble in getting near the stove, are, according to the evidences, makers of automobiles who went into the business after the famous court decision was handed down, disregarding all the attending facts. This will be especially true, unless they can show that they are in for the good of the automobile business as a whole.

GLIDDEN TROPHY MAY NOT BE ABANDONED

NEW YORK, Jan. 27—These are busy times for Chairman S. M. Butler of the A. A. A., due to the shower of protests which are reaching the Contest Board, following some preliminary discussion having for its purport the elimination of the Glidden Trophy from the acreage of contest. The meeting of the Board on the 25th instant, which numbers in its membership David Beecroft of Chicago, F. B. Stevens of Rome, N. Y., T. A. Wright of Wilkes-Barre, Pa., and Joseph H. Woods of Newark, collaborating with Chairman Butler.

The meeting of the Board seems to have been rather protracted, and the principal matter of discussion was, first, as to the expediency of any further effort involved in the Glidden Trophy. The consensus of opinion being that it would be ill advised to abandon the trophy at this time in view of the wide interest which is taken in it by the makers, the public at large and automobile drivers and owners in general.

Conceding that the trophy will be contested for, the next matter of great importance and knotty characteristics lies in the selection of the route. While this is a matter which cannot well be settled off hand, and which may demand the sending out of a "path finder," it is nevertheless likely to fall to a Southwestern orbid. The meeting adjourned without having taken definite action on either of the questions, but the sentiment seems to be in favor of a run of a reliability tone which will start from Cincinnati and take in Memphis, Tenn., Dallas, Tex., and Oklahoma, ending at Chicago. The fear has been expressed that many of the roads which might be included in this circuit are quite impossible to any sort of vehicles, and a pathfinder may have a stout task in front of it in the process of surveying the boundaries of the route.

NEW CONCERN FORMED OUT OF BROWN-LIPE

The Brown-Lipe-Chapin Company, with a capitalization of $1,500,000, has been organized in Syracuse, N. Y., to take over the differential gear department of the Brown-Lipe Gear Company. C. S. Mott, of the Weston-Mott Company, Flint, Mich., is the only stockholder not in the parent corporation. During the past two years the present plant of the Brown-Lipe Gear Company has been worked day and night with 825 employees. The increasing demand made it necessary to separate the differential gear department from the transmission and steering gear department to provide sufficient room for the latter.

The business of the new company will be managed by H. W. Chapin, who for the past fifteen years has been general manager of the Brown-Lipe Gear Company. He will retain this position in addition to his new one. The new company will assume all of the differential gear contracts of the parent, and all the machinery and equipment used by the latter in this branch will be turned over.

REDUCED R. R. RATES TO CHICAGO

The Central Passenger Association will grant the rate of one-and-a-half fare to visitors to the Chicago show on account of the A. A. A. Convention. Ticket agents will issue certificates for this purpose, which will be validated at the headquarters of the A. A. A. in Chicago. They will be good only provided one thousand or more are presented. Membership in the association is not essential.

CLEVELAND ALSO BOOKS TWO SHOWS

CLEVELAND, Jan. 25—With the exception of a small amount of gallery space, the entire floor of Central Armory has been allotted to prospective exhibitors at the show to be held during the week of February 19 by the Cleveland Automobile Show Company. A great demand has also been manifested for space in the second show, to be held during the week of March 5. This exhibition will be conducted by the Cleveland Automobile Club, also in Central Armory.

SUBSCRIPTIONS—NATIONAL CONVENTION

The latest revised list of the paid-in subscriptions to the National Convention fund of the A. A. A. as reported by Charles Thaddeus Terry, chairman, shows a keen interest on the part of the clubs, as the following list indicates:

Name of subscriber.	Amount of subscription.
Automobile Club of Buffalo	$500.00
Quaker City Motor Club	100.00
Pennsylvania Motor Federation	250.00
Springfield Automobile Club	200.00
Automobile Club of Southern California	125.00
Albany Automobile Club	50.00
Oliver Crosby (individual subscription)	25.00
Automobile Club of Pittsburg	50.00
Automobile Club of Hudson County (N. J.)	100.00
Automobile Club of Auburn	150.00
New Jersey Automobile and Motor Club	200.00
Atlanta Automobile Association	200.00
Associated Automobile Clubs of New Jersey	100.00
Denver Motor Club	50.00
Long Island Motor Club	300.00
Automobile Club of Philadelphia	250.00
Delaware Automobile Association	50.00

AUTHENTIC FIGURES OF AUTOMOBILE PRODUCTION

INTEREST seems to center in forecasts of the automobile production for the season of 1909-1910, partly because of the general interest which is taken in the industry, and for the rest—in view of the known facts—automobiles are undoubtedly being turned out at an enormous rate. The chart here given was made under the direction of Alfred Reeves, General Manager of the A. L. A. M., and it is the net result of a very careful canvass of the whole situation within the confines of the licensed association. Just what number of cars should be added, considering unlicensed builders, is a matter which will have to be left to conjecture.

At all events, a brief statement of facts, based on this chart, is extremely interesting, the figures being as follows:

PERCENTAGE PRODUCTION OF AUTOMOBILES SINCE 1905

Years.	Percentage.
1904 over 1903	30
1905 over 1904	51
1906 over 1905	41
1907 over 1906	18
1908 over 1907	17
1909 over 1908	130

Authentic figures on the production of motor cars during 1909 have been compiled by the Association of Licensed Automobile Manufacturers, and show a startling increase over the production of 1908. The figures indicate that the licensees under the Selden patent alone made 94,891 cars. This is believed to be about 85 per cent. of the cars made. The compilers have added to these figures 20,000 cars as the product of the outsiders, making a total production for 1909 of 114,891 cars—far in excess of what was indicated six months ago, when it was declared that 80,000 cars would be made.

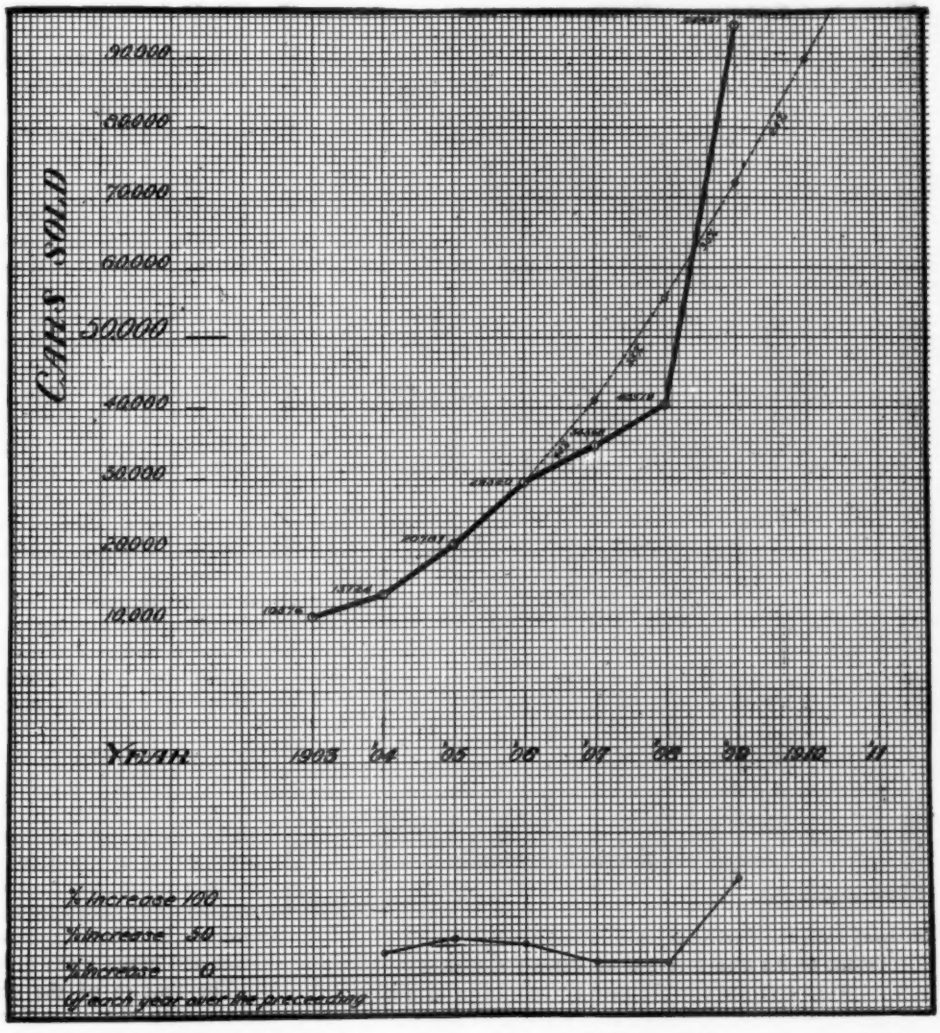
The figures indicate very clearly that production has reached a point that warrants at least a careful look into the future by the makers. There is nothing on the business horizon now to indicate that the present year will be anything but a prosperous one for the motor-car builders; yet the figures shown on the accompanying chart, prepared and issued by the A. L. A. M., are worthy of the deepest thought.

Prior to the decision sustaining the Selden patent last September, the business of the motor-car builders was divided about half in the Selden camp and half among the outsiders; but since the decision and the application and granting of licenses to a score or more additional makers the licensed product amounts to not less than 85 per cent. of the total business, and includes the cars of almost every concern of standing. All the Selden patent licensees conduct their business independently of the others and in strict competition.

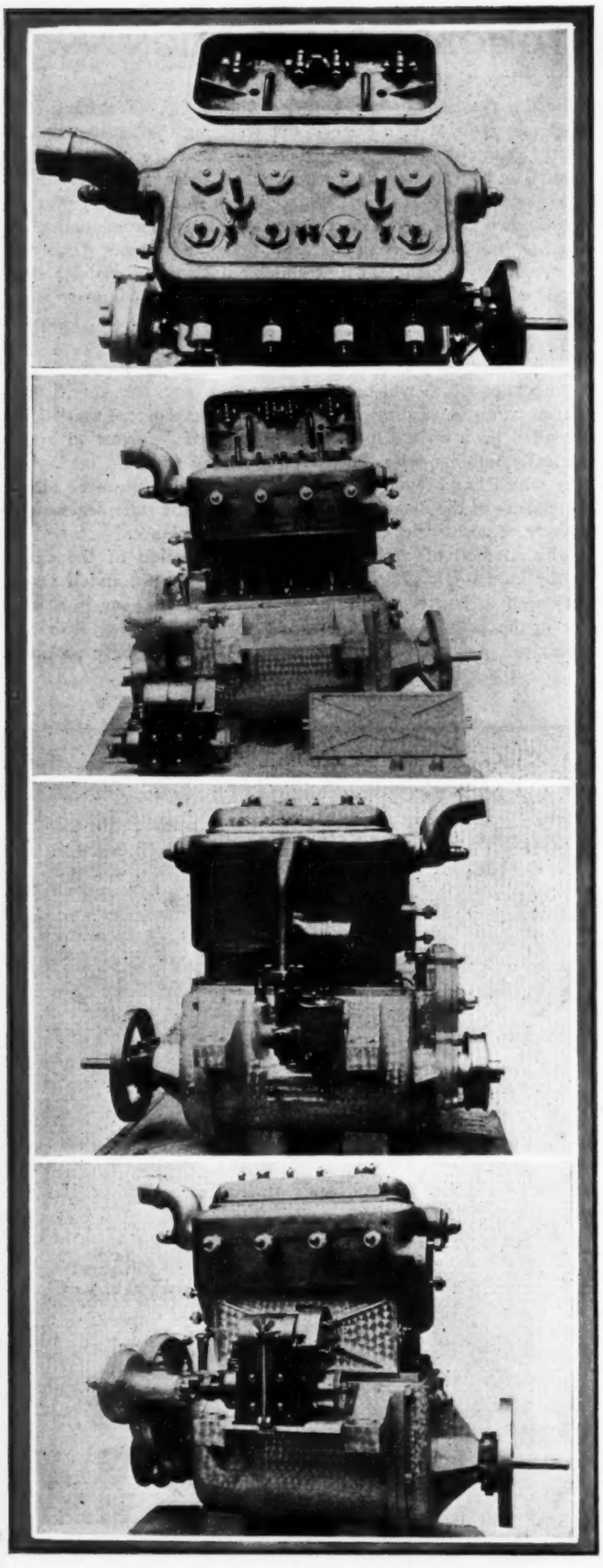
All attempts thus far to arrive at anything like accurate statistics which would reflect the magnitude of the automobile industry were rendered futile by the competition which was in evidence when partisans, in the interest of their cars, made bold to proclaim the number which they would build. Watering stock has been reduced to a science, but watering the figures of some of the estimators became so troublesome as to be rendered impotent. To illustrate how uncertain some of these guesses really are, it is pointed out that in an estimate which was made last year one well-known company said it would build 1,500 automobiles and another well-known company said it would turn out 5,000 cars. The company which said it would build 1,500 automobiles made good, and had a little margin to spare, but the company which said it would build 5,000 cars reached the magnificent figure of 80 cars by dint of hard labor.

This uncertainty is present in all estimates of the number of automobiles which will be turned out, to a sufficient extent when the situation is carefully canvassed by a competent statistician, provided he is in touch with the source of information and is perfectly familiar with the character of the work in hand. One way which has been tried with some success is to check all the statements of the makers of cars against all the statements of the makers of accessories and thereby strike a balance.

This method of arriving at an approximation of the extent of the industry has been tried out at some length, and it served very well to bolster up the contention that this year is a large one in the automobile business, and that most conservative estimates are just a little conservative. The chart here produced reflects the whole situation with much accuracy.



Number of Cars Made by Selden Patent Licensees During 1903-1909, as Estimated by A. L. A. M.



Showing How the Overhead Inlet Valves Are Operated
Details of the Monobloc Engine Valve Mechanism
Illustrates the Compactness of This Form of Engine
Magneto and Valve Side of the New Engine

A GOOD EXAMPLE OF MODERN TENDENCY

PARIS, Jan. 18—A good example of modern tendency in motor construction is to be found in a monobloc production by Chapuis & Dornier, a French firm building motors exclusively for the trade. The greatest demand in Europe at the present moment is for low-powered four-cylinder motors, as small, as light, and as silent as possible. The overall length of motors has been cut down in a remarkable degree since the introduction of the monobloc method of casting, and the limit appeared to be in the valves. With a single camshaft and eight valves in a pocket all on one side it was not the size of the engine bearings which proved an obstacle, but the valves, if these were to be of sufficient size to allow of adequate feeding of the motor. It was possible to superimpose them, by working the inlets from rocker arms, and maintaining a single camshaft, but this is not a solution that appealed to the constructor, for the user desires a motor that has no visible working parts, that looks, indeed, like a metal box with a few pipes and four plugs attached.

The Chapuis & Dornier solution is to employ a single camshaft, with exhausts operated from below and intakes immediately above operated by a special type of overhead mechanism. This design allows the cylinders to be placed as close together as possible compatible with a safe amount of metal in the walls. The thickness of the wall between the cylinders is 5 millimeters, and as a central bearing is not employed the overall cylinder length of a motor of 2 9-10 inches bore is only 15 inches. The four cylinders being responsible for almost 12 inches of this, the remaining 3 inches give the necessary amount for metal in the walls and for water jacketing at each end. The total overall length—from tip to tip of the crankshaft—is practically twenty-eight inches.

With good castings the makers declare that an engine of these dimensions will furnish adequate power without any danger of warping. The short length of the crankshaft makes a central bearing unnecessary, thus doing away with the difficulty of lining up a three-bearing crankshaft, and at the same time leaving an ample bearing for the connecting rod ends. By superimposing the valves it is possible to obtain a very large area, the diameter of the valves on this motor being a little more than half the bore of the cylinders. On of the disadvantages of the many monobloc motors has been the small area of the valves, resulting in a perpetual starving of the cylinders. There is nothing of particular note about the exhaust valve mechanism. The intake is operated from above, but instead of the vertical push rods being external, they pass through the pocket, in which they are guided at two points, and project above the cylinder head. The rocker arms are mounted on the inner face of an aluminum housing secured to the cylinder head by nuts fitting on two projecting bolts. One end of the rocker receives the pushrod, while the other fits on the extremity of the projecting inlet valve stem. The vertical push rod is provided with means for taking up any play which may be produced.

In addition to carrying the rocker arms, the cover completely encloses the cylinder head and hides from view all moving parts. As the valve stems are enclosed by an aluminum plate secured by a couple of thumb screws, there is no moving part visible excepting the extremities of the mainshaft. The plugs are carried in the side of the engine, between the inlet and exhaust valves, and on the same side as the magneto, thus necessitating very short leads. Water cooling is by thermo-siphon circulation, the space around the cylinders being adequate and inlet and outlet pipes of very large diameter.

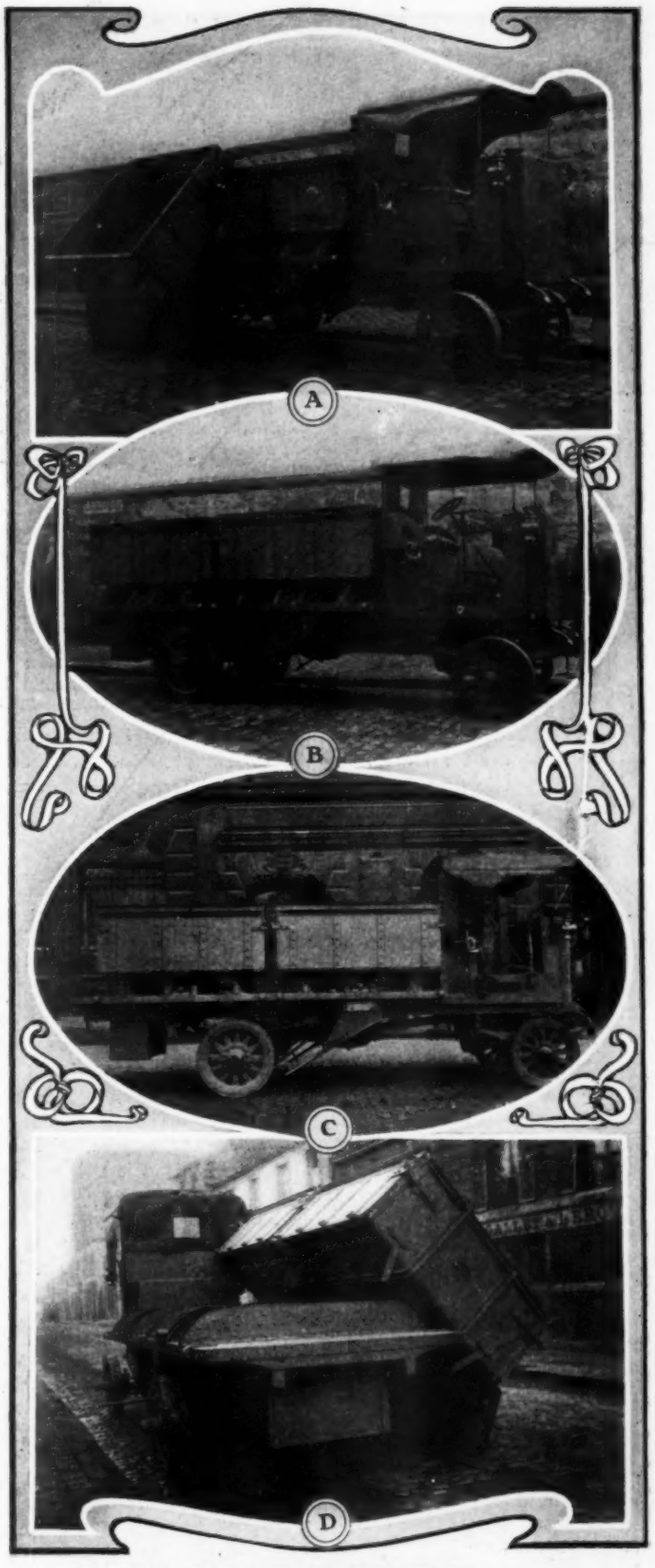
The feature of the crankcase is that it is entirely of one piece with the exception of the end plate stoutly bolted in

position. It is claimed for this design that there is an increase of strength compared with the usual type of base split longitudinally. Naturally it prevents leakage of oil, for it is easy to make the single joint oil tight, but it is not possible to inspect the connecting rod ends without taking down the motor. Timing gears are enclosed in an aluminum housing at the forward end, and merely consist of three pinions, the main one, on the crankshaft, having an elastic mounting to prevent "chattering" of the pinions on quick changes in the speed of the motor. The gudgeon pin also is mounted with a couple of special spring washers giving the necessary slight lateral play but without any objectionable metal-to-metal rattle. The carbureter is carried on the right-hand side of the motor, with a single lead to the intake manifold cast with the cylinders and warmed by the circulating water. Normally lubrication is by splash, and with this object in view as much metal as possible has been left on the upper face of the crankcase, and the opening is further closed by a baffle plate allowing the connecting rod to pass with an easy fit, but preventing the passing of an excessive quantity of oil. The end of the crankshaft is provided for the fitting of a lubricating pump if desired. Three models are built of respectively 2 9-10 by 4 7-10 bore and stroke; 2 7-10 by 4 7-10, and 2 1-2 by 4 3-10. It will be noticed that in all cases the ratio of stroke to bore is high.

After nearly two years' exhaustive tests, the Panhard-Levassor Company has decided that the sliding valve motor invented by Charles Y. Knight, of Chicago, has made good its claims and can be produced with the guarantee of the Avenue d'Ivry factory. During the past six months several of these motors have been on the road fitted to cars owned by private members of the firm. The first series will be produced, in all probability, about June next, and will be of a very limited nature. Unless the motor acts quite differently in the hands of private owners from what it has done when driven by the experts, a large series will be built for the 1911 season. The cars at present on the road are declared to have a rating of 15 horsepower, but as they are capable of averaging 45 miles an hour on French roads, with a closed body and four passengers, this rating can certainly be taken as extremely conservative. It is very improbable that the Panhard-Levassor Company will build all their models with the Knight engine, as has been done by the Daimler Company in England, but will fit it to the larger models of respectively 15 and 25 horsepower, both with shaft drive. The only other Continental firm at present building the Knight motor is Minerva, in Belgium. Mercedes has secured the rights in Germany, but does not yet appear to have made a move.

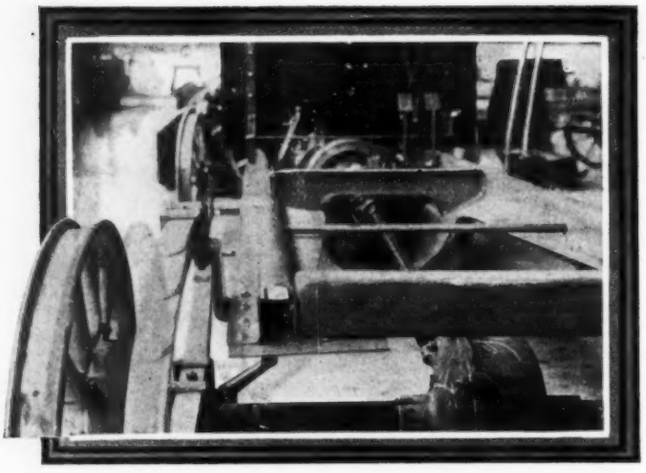
Power vehicles have played an important part in the construction of the Paris underground electric railway, but up to the present have always been of the steam variety. The latest type, to be adopted for this work is a tip wagon driven by a Cohendet, a two-cylinder vertical motor of 5 3-5 inches bore and stroke. The power plant seems small in comparison with the work that has to be done, but as the vehicles constantly deliver 5-ton loads from the boring in the city to the suburbs or the river wharf, it would appear to be sufficient. The motor is carried forward, under the driver's feet, and low down to secure a perfectly horizontal drive to the gear box and countershaft. Four speeds and reverse are provided, and final drive is by side chains.

As a truck of this nature can never expect to receive tender treatment, there is a big margin of safety in all the organs. Solid rubber tires have had to be discarded for reasons of economy, in favor of metal bands, with springs, however, made specially long, and shock absorbers fitted in order to protect the mechanical organs as much as possible. Even the radiator has been abolished as too fragile an organ for this class of work, and its place taken by a very large water tank with condenser. The tip wagons are all metal, mounted on rails, and capable of being tipped either left or right by hand-operated gearing. These vehicles show the great care with which the French constructors design and build specially for every class of work.



Cohendet Double Tip Wagon Operated in Paris
The Two Hoppers Easily Accommodate Five Tons of Earth
Showing Substantial Construction of Steel-Shod Wheels
Hoppers May Be Tipped Either Together or Singly

As so much of the labor in their factories is hand work, which is relatively cheap here, they can do this to much better advantage than the American constructors. In cases like the present instance, the system of individual construction produces vehicles of remarkable efficiency in service.

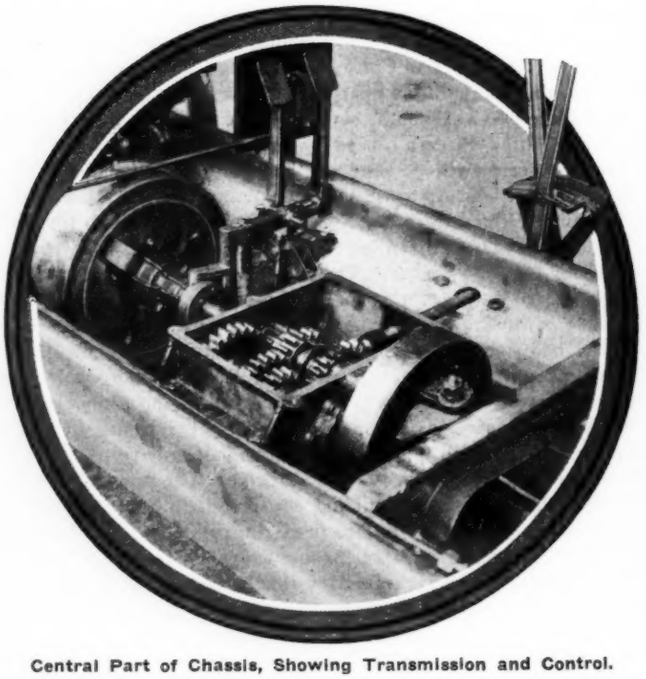


Appearance of the New Darracq from the Rear.

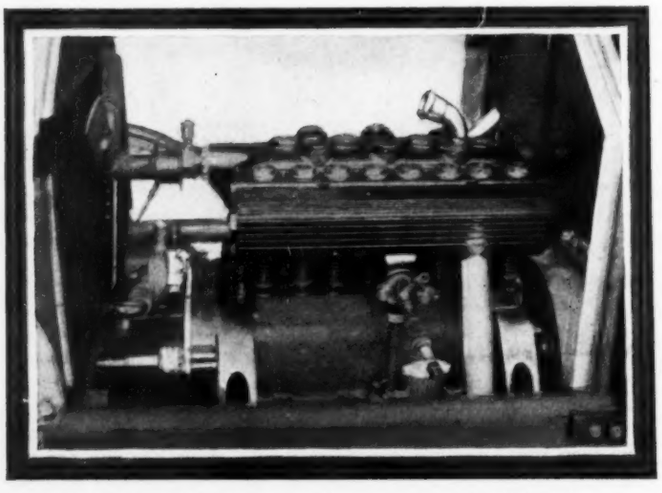
EXTREME SIMPLICITY FEATURE of DARRACQ

PARIS, Jan. 19—At a time when good automobiles are far from being the exclusive production of any one firm, more than ordinary interest attaches to a car which even causes constructors to sit up and take note. The new Darracq can claim to have created more than a mild sensation on the European market, for it is a four-cylinder car of 14 nominal and 19 actual horsepower, sold complete with touring body at only a fraction over a thousand dollars. The secret of the low price lies in a simplified and labor saving design, rather than in an unusually large series, though, of course, it is believed that the new production will figure well on the sales lists. Its first success has been on the English market, where the requirements are a medium-powered touring car as simple, silent, speedy and cheap as it is possible to make it.

Extreme simplicity is indeed the outstanding feature of the Darracq chassis. It is so clean cut, indeed, in comparison with the average chassis, that the first impression is that the vehicle is not complete. But if organs have been suppressed it is only because they are useless, and their abolition would entail a decrease in weight, the use of less material, a saving of labor in fitting, and a cheapening of the cost of maintenance. For instance, the frame members have been redesigned to lessen labor in assembling. The section is an inverted U, stamped out complete with dumb irons and an inswept portion forming an integral subframe for the motor and gear box, or, in other words, allowing the motor and gear box to be mounted direct to the frame without the use of side arms. All the labor necessary on the chassis proper is the placing in position and riveting of three cross members, also of inverted U section, one at each end and one in the center. Add to this a sheet-metal underpan, rivetted to the extremities of the inswept frame members, and the constructor has, in addition to a rigid frame, a structure on which all the mechanical organs are fully protected from dust and mud. The pan is pierced in one place only, for the passage of the oil plug in the base of the crank chamber. The inswept portions of the side members are pierced in three places only, for the passage of the drag link on the steering gear, the change speed and brake connections and the exhaust pipe. In passing it is worth mentioning that the exhaust pipe is the shortest ever fitted to a touring car. From the exhaust manifold cast with the cylinders, a short straight length of pipe passes directly into the exhaust box immediately below on the underside of the frame. It is only a detail, but it is sufficient to show how everything has been worked out with a view to simplicity. An additional advantage of this type of frame, which is a production of the well-known Arbel establishment, is that the body work is brought fully four inches lower than would otherwise be possible. It does not rest on the highest portion of the frame member, but on the two flanges.



Central Part of Chassis, Showing Transmission and Control.



Valve Side of Engine, Showing Exhaust and Carbureter.

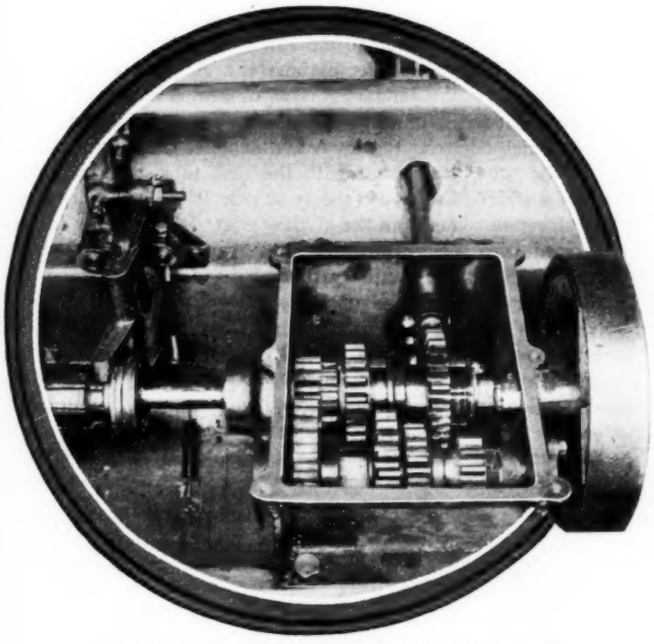
The motor is a four-cylinder in one casting, valves all on one side, intake and exhaust manifolds cast integral with the cylinders, and the latter ribbed for cooling. Cylinder dimensions are 3.3 bore by 3.9 stroke. Piping is reduced to a minimum. The exhaust, as already explained, is a twelve-inch length without a bend in it. The intake is just as simple, consisting of a short vertical tube, the upper end of which screws into the intake manifold and the lower end fits round the vertical jet. Throttling is done at the upper end of the tube, and at the same point is an automatic additional air inlet. The feature is one that first made its appearance on the 1908 Charron, but has since been adopted with detail modifications by a number of leading makers.

The water pump is retained, contrary to the more general tendency on medium powered European cars, the constructors being of the opinion that the slightly increased complication is more

than paid for by the decrease in the size of the radiator and the weight of water carried. The pump is of the centrifugal type worked off the same pinion as the high-tension Bosch magneto. The timing gears thus resolve themselves into three pinions only, all enclosed at the forward end of the motor. A ventilator fan is carried, driven by flat belt off the main shaft.

The feature of the motor is undoubtedly the lubrication, which is of the forced feed type, but without any visible pipes, and without any dashboard fitting suggestive of oiling. The lower portion of the crankcase forms an oil reservoir, the filler —and at the same time breather—which is on the right-hand side of the motor, the driver's only care is to keep a sufficient quantity of oil in this tank. This is made easy by placing in the oil reservoir a balanced wood float, to which is attached a vertical rod projecting through the cap of the breather and filler. The length of spindle showing above the filler cap is indicative of the amount of oil in the case.

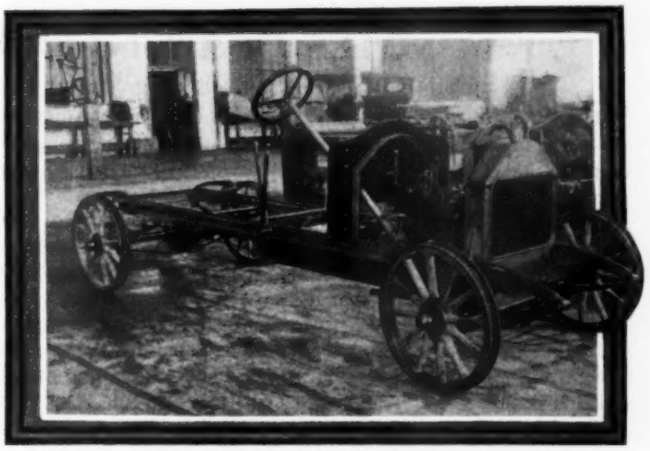
The oil pump is contained within the crankcase, and is operated by an eccentric on the camshaft, the lubricant being forced to all the main bearings, while the connecting rod ends are lubricated by splash from a shallow trough in which a constant level is maintained, the overflow returning to the oil well in the base of the chamber. The working of the pump can be verified by a tap



Closer View of Transmission, Showing Gear Sizes.

on the upper portion of the crankcase, and the piston of the pump can be withdrawn through the plug in the chamber.

The clutch is of the cone type, with springs behind the leather, and is in no way distinctive except by reason of the ease of dismounting. The gear box gives three speeds and reverse through a gate change. Owing to the form of the chassis only very short arms are necessary to attach the gear box to the frame members. An interesting detail is that the gear shifter is mounted on the shaft operating the foot brake at the rear of the gear box. The feature of the rear axle is the entire absence of a torque stay, this work being performed by the three-quarter elliptic springs, the seatings of which are made stronger in view of this work. Control is entirely on the throttle, through a foot accelerator, the sparking point being fixed. The dashboard is perfectly clear. There being no lubricator or pressure indicators to verify, the car is a remarkably easy one to handle. The first series of vehicles now being produced consists of open touring cars with five-passenger body. It is declared that the same model will be used for taxicab service, and that an order for 3,000 of these vehicles is now in hand to be sent to India.



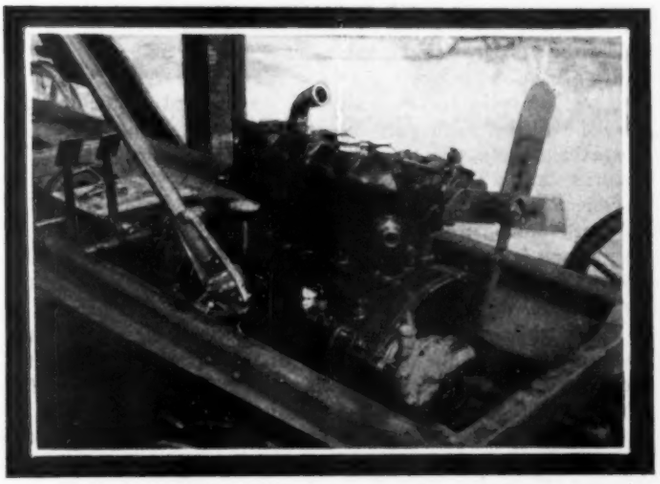
Complete Chassis, As Viewed from the Front.

SHIPMENT BY TRUCK—LONDON TO PARIS

PARIS, Jan. 20—The first attempt to compete with railroads in the matter of international transportation of goods has been made by the firm of Waring & Gillow, furniture dealers having establishments in London and Paris. The ordinary method is to ship goods by rail and steamer, closed vans, capable of being slung from truck to train and from train to steamer, always being employed when a full load is available. As there was a considerable amount of traffic between the London and the Paris houses, and it frequently fell to the firm to make large removals, the experiment was tried of shipping by auto.

After loading at the London house the driver of the three-ton truck covered the 80 miles separating the British capital from New Haven, and there ran the vehicle on board the cross-Channel steamer under its own power. On landing at Dieppe there were custom formalities, naturally, but with the aid of the triptyque system and the facilities which can be established when a regular service has been organized, this should not occasion any delay.

In the matter of time the automobile service is a distinct advance on the railway, for it is possible to leave London with a full load in the morning and deliver in Paris on the evening of the following day. By the ordinary method three days would certainly be necessary. At present it costs a little more to transfer goods by automobile instead of by rail. With a well-developed service, however, the cost can be brought down so low as to compete very favorably with the railway, while if account is taken of the lessened risk of breakage, there is a decided advantage in favor of the automobile. Although the present service is only between London and Paris, it is planned to extend it later to include all good roads radiating from London.

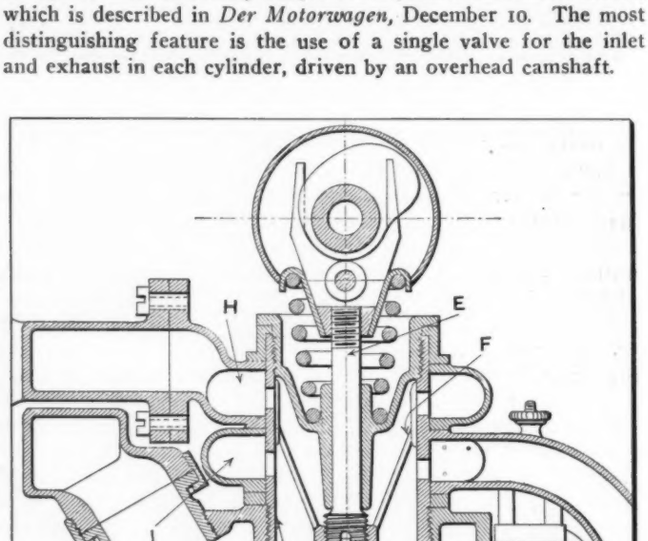


Magneto Side of New Darracq Block Engine.

NOTES OF UP-TO-DATE PRACTICE IN EUROPE

FOREIGN practice, in a way the progenitor of the American, offers many suggestions to the wide-awake engineer. However, as the perusal of the representative English, French and German magazines consumes more time than a busy man would devote to this subject, THE AUTOMOBILE will endeavor to summarize in each issue a number of examples taken from foreign exchanges. Care will be taken to give the name and date of the magazine quoted, in order that it may be possible to refer to the original source for additional information.

Combined Inlet and Exhaust Valve—Palous & Beuse have brought out an extremely simple four-cylinder aeronautic motor, which is described in *Der Motorwagen*, December 10. The most distinguishing feature is the use of a single valve for the inlet and exhaust in each cylinder, driven by an overhead camshaft.



Palous & Beuse Combined Inlet and Exhaust Valve

In the head of each cylinder is a single valve port, normally closed by the valve G. The valve cage K, screwed into the cylinder head, has two circumferential rows of holes, the lower for the exhaust and the upper for the inlet. These holes are opened or closed by a sleeve F attached to the valve stem. The camshaft has for each cylinder a single cam of an unusual profile. The upper end of the valve stem has threaded directly on it a yoke encircling the shaft, to prevent rotation of the stem, and also carrying the roller upon which the cam bears. For the exhaust the cam presses the valve down about 6 mm., opening the valve proper and bringing the lower edge of the sleeve F down to the row of holes for the exhaust. At the end of the exhaust stroke a further downward movement causes the sleeve to cover the exhaust holes and open those of the inlet. Finally, the valve returns sharply to its seat.

Objections to this valve are easy to find; the sudden return to its seat from a lift of three-quarters of an inch must make a noisy engine and at the same time have a destructive effect on the valve itself. It will be noted that during this return, at the end of the inlet stroke, the exhaust valve is momentarily opened.

Comparison of Worm and Bevel Drives—In view of the widespread use of the worm gear for final drive in place of the bevel on English cars, a comparison of the two systems in *The Automotor Journal* of January 1 has much of interest.

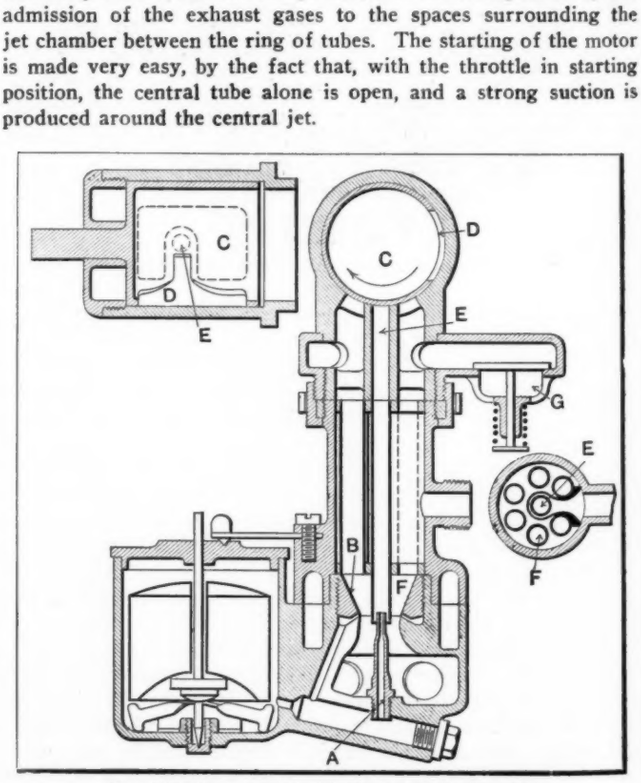
According to this paper, most manufacturers who have adopted the worm drive have done so because of its inherent quality of silence. The worm drive is by nature a more silent mechanism than the toothed bevel, because its method of transmitting power is absolutely continuous and of a sliding wedge-like kind. The bevel depends for its continuity of action on the accuracy of its manufacture, since, by nature, its operation consists of a sequence of blows. To an extent the worm and bevel may be compared, respectively, to the propeller and paddle-wheel in steamship propulsion.

From the purchaser's point of view, the relative efficiencies of the worm and the bevel are largely associated with the practical differences that are likely to be noticeable on the road. It is a common opinion expressed among those who have had experience with both types of car that the only noticeable difference between the two is to be observed under conditions of starting and coasting. A car fitted with a worm-driven axle would seem, in general, to convey the impression of a slight sluggishness, more particularly in not getting away so quickly from a standing start.

Proper lubrication is the secret of success with the worm drive. The worm, with its wedge-like sliding action, seems to have an especial propensity for squeezing the oil out from between the surfaces in contact.

English Multiple-Jet Carbureter—On the 12-16-horsepower F. L. car, recently introduced to the English market, there is incorporated a novel multiple-jet carbureter. A description of this device appears in the January 8 issue of *The Autocar*.

There are two carbureting chambers: the one formed by the tube E, which encircles the jet A and supplies the mixture at low speed; the other concentric with the first tube, and taking the form of a series of tubes F (shown in plan in the small drawing), which draw gasoline from the auxiliary jets B. A rotary throttle C, formed with a carefully designed aperture D, uncovers the central tube E or the auxiliary tubes F in increasing proportion. An additional air valve G operates in correspondence with the motor speed. When the motor runs slowly, the whole of the mixture used passes up the central tube E, and it is therefore necessary that this tube be kept hot; this is accomplished by the admission of the exhaust gases to the spaces surrounding the jet chamber between the ring of tubes. The starting of the motor is made very easy, by the fact that, with the throttle in starting position, the central tube alone is open, and a strong suction is produced around the central jet.



Novel Design of F. L. Multiple-Jet Carbureter

FARMAN BROTHERS LEAD ALL FRANCE IN AVIATION

By W. F. Bradley.

PARIS, Jan. 20—When the old year rang out the Farman brothers remained the leaders in the aviation world, for Henry had definitely secured the Michelin trophy, and his younger brother, Maurice, had made the longest cross-country flight. The last week of the old year, however, was an anxious time for the holder of the Michelin record. On November 3 he had put up a distance of 138 miles in 4 hours 6 minutes 25 seconds, compared with 2 hours 20 minutes, by Wilbur Wright in 1908.

The most dangerous rivals were Edouard Chateau and G. Legagneux, both connected with the Voisin Company, and Hubert Latham, the managing director of the Antoinette factory. Fearing that they might snatch the trophy from him at the last moment, Farman had a machine specially prepared, carrying a load of nearly 30 gallons of gasoline, and ready to be taken out at a moment's notice.

Chateau was the first to make an attempt on a new type of Voisin, driven by a four-cylinder Voisin motor. On account of the large supply of gasoline carried it had been necessary to fix the tank low and secure a flow by means of pressure. After covering a short distance the tank burst and Chateau had to abandon. Legagneux, who was similarly equipped, had a backfire to the carbureter, which set his whole machine ablaze while in the air on a trial flight. As there were 25 gallons of gasoline on board the situation looked dangerous for a few moments, but Legagneaux managed to come to earth and have the flames extinguished without any serious damage to his person. Most of the lower plane was burned away, and the woodwork suffered so much that it was impossible to make another attempt on the last day of the year.

Latham remained as a menace to Henry Farman, and when he brought out his Antoinette on the last day of the year, the biplane champion gave orders also for his machine to be pushed onto the plain. The two started almost at the same time over the military ground near Mourmelon, Latham with the intention of beating the Farman record of 138 miles, and Farman with the determination to fly further and faster than his rival. It was a speed as well as an endurance test, for account is taken of distance covered round a triangular course, and not of the total time in the air. Farman employed all his skill, taking the turns short and in a masterly manner, while Latham, higher and more impressive, was in danger of being lapped by his opponent. The duel lasted for an hour, at the end of which time Latham was obliged to descend owing to his motor overheating.

Fearing that another attempt would be made to break the record, Farman continued to fly around the course alone. When he had been in the air 2 hours 24 minutes, and covered a distance of about 100 miles, he made a voluntary landing, for it was then too late in the day for any other aviator to beat the November record before the official hour of sunset.

Maurice Farman Flies to Orleans—While Henry Farman was flying at Mourmelon to retain the Michelin trophy, his brother Maurice was making an aerial trip from the town of Chartres, on the Beauce plains, to Orleans, in the Chateau country. The voyage was the continuation of one commenced at Buc, in the suburbs of Paris, a couple of weeks before. Farman had originally intended, after his descent on the town of Chartres, to continue by stages to Bordeaux, some 300 miles away. In view of the wintry weather, however, this was abandoned in favor of a trip to Orleans only.

The distance is about 47 miles, over fairly open country. The task was rendered difficult, however, by the start, which had to be made from very heavy ground. It was not until the frost had dried out the rain that a start could be made on the last day of the year. Rising to a height of 200 feet, Farman soon left in the rear his mechanics and friends endeavoring to follow him in fast automobiles. Fifty minutes later he had landed without a broken spar in an open field chosen in advance on the outskirts of the town of Orleans. The trip so successfully accomplished is a record for cross-country travel. The aeroplane employed by Farman is a biplane of his own design, but having a certain resemblance in its general features to the machine employed by his brother. The motor, which has always been used on this aeroplane, is an eight-cylinder, air-cooled Renault, on the camshaft of which is mounted a two-bladed wooden propeller, having a diameter of nearly 8 feet. Naturally the camshaft is specially strengthened, its diameter being equal to that of the crankshaft, while the timing gears have more resemblance to those employed in the gear box of a powerful touring car than to the usual fine construction.

Maurice Clement, the brother of the better-known Albert, killed a few years ago on a racing car at Dieppe, is now giving lessons in flying to Mlle. Helene Dutrieux, one of the first lady areonauts in France. The machine employed is the first of the "Demoiselle" monoplanes built in the Clement factory, under the supervision of Santos-Dumont. Although the general design has been retained, the new "Demoiselle" is a much more comfortable machine for its occupants than the model with which Santos-Dumont made his first flights. It has been raised higher from the ground by the use of larger wheels, and the pilot is comfortably housed below the wings in an automobile type of light aluminum bucket seat. The motor, too, is more powerful, being a four-cylinder Clement-Bayard of 40 horsepower.

PARIS PLANS AERO AND AUTO SHOWS

Paris, Jan. 20—Paris has decided to hold its second annual aeronautical Salon in the Grand Palais in the Champs-Elysees, from Saturday, October 15, to Wednesday, November 2. The event will practically be a repetition on an enlarged scale of the first aero show, held in 1909. Uniform stands will be adopted, and although the event will be made as artistic as possible, money will not be wasted on mere decorations. The hall is so large that about one-third had to be boarded up for the first exhibition. Aeronautics, however, are developing at such a rate that doubtless the whole building will be occupied for the 1910 event.

Unlike the aero manufacturers, the automobile constructors are far from advanced in their preparations for the next automobile show. It is generally understood that an exhibition will be held, and that the Grand Palais will be occupied as on previous occasions, but absolutely nothing has yet been decided officially. The hall having been secured by the aero manufacturers until the first week in November, it will be necessary for the automobile men to hold their event later in the year, either towards the end of November, or, more likely, during the month of December.

TEN 'PLANES FOR PYRAMID AERO MEET

Paris, Jan. 20—One American and nine French aeroplanes will take part in the Egyptian races to be organized by the Aero Club of France from February 6 to 13. The American machine is a Curtiss biplane to be piloted by De Riemsdyk. Mortimer Singer, an American sportsman, will pilot a Farman biplane, with Arthur Duray, the well-known race driver, as his companion. Hubert Latham and Hanvette will have Antoinette monoplanes; Rougier, for a long time team-mate with Duray, will pilot a Voisin biplane together with Metrot and Mme. Delaroche, providing the latter recovers from an accident sufficiently early to earn her pilot's certificate; Le Blon and Jacques Balsan will each have a Bleriot monoplane. The races, the first of the year, are to be held on a specially prepared aerodrome established on the edge of the desert in the vicinity of Cairo.

Paulhan's First American Flight

LOS ANGELES, Jan. 22—Aviation week was concluded Thursday by a remarkable race between Paulhan and Curtiss, which, like the meet itself, resulted in divided honors. Paulhan went up at 3:25 in his Farman biplane for an endurance flight. After he had done two or three laps of the course, Curtiss started a ten-lap speed trial, half a lap, or more than three-quarters of a mile behind him. The two aeroplanes came over the grandstand at a fifty-mile clip, with Curtiss gaining rapidly. On the third lap the little American machine, high in the air, caught up with the big French one. For a few seconds Paulhan held even. Then Curtiss went over his head, at first for a single length, finally half a lap. Curtiss came down after a thirty-mile trip, but Paulhan continued flying for an hour and a half, covering 64.4 miles.

This one race summarizes the whole story of the meet. The Curtiss machines won all the prizes for speed, quick starts and perfect landings; Paulhan, on the other hand, won the cross-country, passenger-carrying and endurance tests. The latter broke world's records for altitude and cross country flights, both alone and with passengers. He will receive more than $15,000 in prizes. Curtiss made no records, and took about $5,000. Charles K. Hamilton and Charles H. Willard, of the Curtiss team, took second and third prizes in most of the events, never equalling the two masters.

Paulhan Inspecting His Seven-Cylinder Motor

Wednesday Paulhan took his wife for a twenty-mile spin out over the ocean. At 2:27, after helping Mrs. Paulhan into her seat behind him, he flew out in front of the grandstand, made his bow, at it were, and then set off toward the Pacific. In ten minutes he was out of sight among the sun-lit clouds. At an altitude of from 500 to 1,000 feet he passed over Redondo Beach, Venice-by-the-Sea and other resorts toward Point Firmin, for half a mile being directly over the ocean. At 2:50 he came in sight of the waiting crowd at the grandstand, and at 3 o'clock made his landing, whereupon he was carried in triumph down the lanes of frantic spectators.

Returning to his machine he began to run a sort of aerial omnibus, and within a short time took up five other passengers, the lucky ones being Mrs. Cortlandt F. Bishop, William Randolph Hearst, Clifford B. Harmon, Lieut. Paul Beck of the United States Army Signal Corps, and a newspaper reporter. Mr. Harmon got a twelve-mile trip, but the others had to content with shorter distances. Lieut. Beck on his trip tried to drop a dummy bomb from a considerable height into a measured square on the ground. He was not successful, but did not miss his mark by a very great margin.

Paulhan, with Maisson and Miscarol, his assistants, is now in San Francisco. It is probable that they will fly at Salt Lake City, Denver and New Orleans, at the last city during Mardi Gras. Beyond that they have no definite plans.

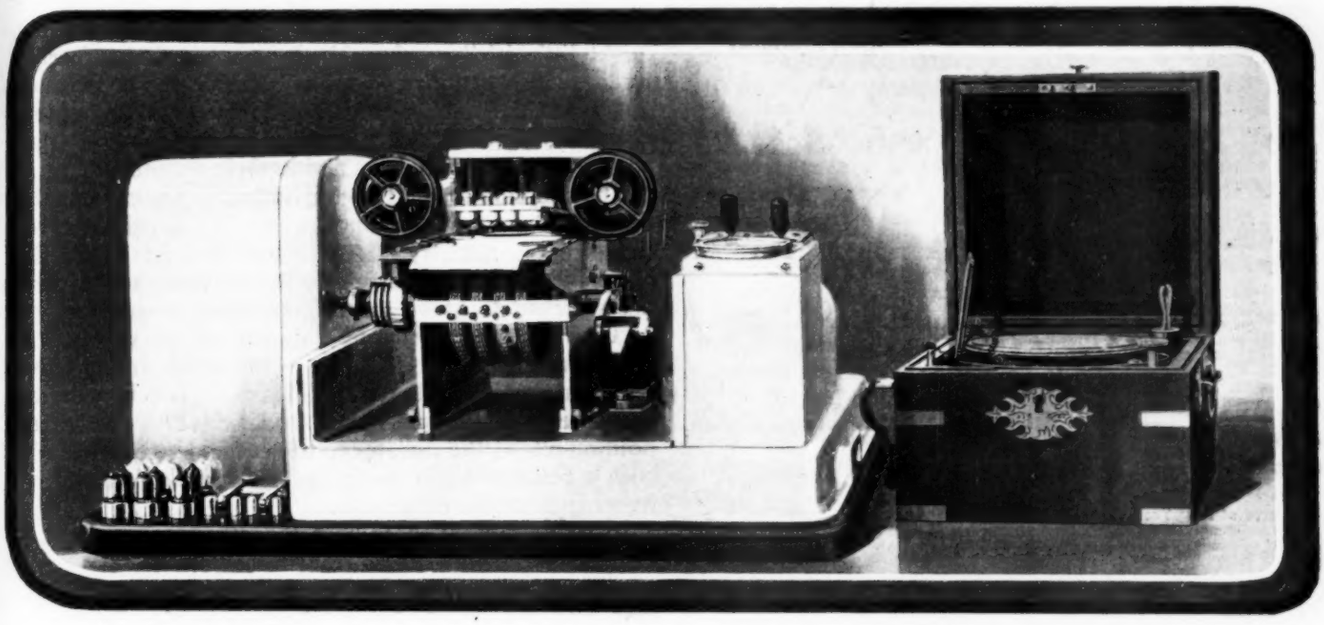
About to Leave the Ground, with Mrs. Paulhan as Passenger

Curtiss Passing the Grandstand Trying for Speed Record

HOW 1910 AUTOMOBILE RACES WILL BE TIMED

RACE-GOERS of the past season will be interested in the 1910 Warner timing instrument, which did such good service at all the principal race meets. The "horograph," as it is called by the maker, the Warner Instrument Company, has been redesigned and put in a more compact and workmanlike form, although the principles of its operation remain the same. In its original form the instrument recorded the times in tenths of seconds, which at the time was thought to be wonderful accuracy. The new "horograph," however, is far ahead of its predecessor, for it records the time in hundredths of a second.

The improved machine was given its tryout at Atlanta last November, and satisfied the most exacting critics. It makes dead heats almost impossible, as even when racers cross the line so close together that the eye alone cannot distinguish any difference, the machine will still find that one or two hundredths of a second separated them. One such case actually took place at Atlanta, where a ten-mile race was decided by 1-100 second at the finish. Some idea of the accuracy obtained may be gained from the fact that a car going a mile a minute goes 10 1-2 inches in 1-100 second.



Warner "Horograph," Which Distinguished Itself at Atlanta, Timing Racers to the Hundredth of a Second

THE AUTOMOBILE CALENDAR

Jan. 24-29.....Detroit, Wayne Hotel Gardens, Third Annual Automobile Show, Detroit Auto Dealers' Association. John Gillispie, Manager, Hotel Tuller.

Jan. 24-31.....Washington, D. C., Convention Hall, Automobile and Aeronautical Show, Automobile Dealers of Washington. B. R. Johnson, Manager, 1313 New York avenue, N. W.

Feb. 5-12.....Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.

Feb. 14-19.....Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main street.

Feb. 14-19.....St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.

Feb. 14-19.....Rochester, N. Y., Convention Hall. Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.

Feb. 19-26.....Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.

Feb. 19-26.....Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26.....Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.

Feb. 19-26.....Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.

Feb. 21-26.....Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-26.....Baltimore, Second Annual Automobile Show of the Automobile Club of Maryland, Fifth Regiment Armory.

Feb. 22-27.....Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26.....Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Sec.

Mar. 5-12.....Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.

Mar. 12-19.....Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 21-30.....Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsmen's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden,, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

April 23-29.....Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

Races, Hill Climbs, Etc.

Feb. 4-6.....New Orleans, Annual Mardi Gras Speed Carnival, New Orleans Automobile Club.

THE AUTOMOBILE

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DETROIT ENJOYING A GENERAL REVIEW

The Detroit show is interesting from two points of view. It is convened in the city of the West which supports 25 makers of automobiles, and the car production in Detroit for this year is estimated at 20,000 more automobiles than were made in all the world last year. Measured in automobiles, last year the world was large, ever so large, but the City of Detroit, where the "natives" say, "life is worth living," has lifted itself by its bootstraps, as it were, and in the doing made it possible to say, as a figure of speech, "a part is larger than the whole." Of the 43 makers of automobiles in Michigan, many of the balance, after deducting 25 in Detroit, are within a short trolley ride of the Pontchartrain, and counting this number of plants as substantially in, or clustered around Detroit, it is something to say that 50 per cent. of all the automobiles made come from this district within a trolley ride of Detroit.

This phase of the automobile industry is probably a little more than half of the whole, but by no means all. Besides the 43 makers of automobiles which center around Detroit, there are accessory plants, tire makers, and body manufacturers, which concerns, while they supply parts to Detroit makers of automobiles, also have a vast trade in 24 States of the Union in which automobiles are made, ranging from a valuation of $200,000,000 per annum in Michigan down to $5,000 in Georgia. It would be a little unfair to Flint, Michigan, to thus give to Detroit the palm—Flint produces nearly $80,000,000 of value in automobiles per annum, taking this year as the basis, and more than $30,000,000 in value comes from Lansing, Pontiac, Jackson and nearby towns. Were this the end it might be worth while to comment on the growth of the industry, but it is scarcely a good beginning and none will dare attempt to fix the boundaries.

ENGLAND GAINING FOREIGN LEAD

Students of the foreign automobile situation cannot fail to be impressed by the remarkable progress made during the past few years by England, as compared with France, Germany and Italy. If the present rate of advance is maintained, another twelvemonth will find the "tight little isle" comfortably in control of the foreign trade. English makers, long submissive to the dictates of Continental fashion, have of late developed an aggressiveness of spirit which has reacted both in the up-to-the-minute design of their cars and in their organizations.

The adoption of the Knight slide-valve system was the first important move. Although this has failed to "revolutionize the industry," it has been retained by all the companies originally using it. But as though this were not sufficient to prove the emancipation, several makers brought out other forms of slide and rotary valves.

The location of the radiator on the dashboard has also found many new adherents. This is logical in view of the spread of thermo-siphon cooling. The dashboard position allows the radiator to be set higher, consequently with a better head of water for the circulation, without marring the looks of the car.

In running gears there have been three important developments: worm drive, front-wheel brakes, and wire wheels. The last are now well-nigh universal in England, and are rapidly being taken up on the Continent.

GOVERNING DEVICES INCREASE SAFETY

While not perhaps as applicable to pleasure cars as to the more prosaic motor trucks, which are fast taking up the horse's burden, the use of any device in the nature of a governor is highly commendable.

As used today in this country these take many forms; one type utilizes the centrifugal action of balls at the outer end of rotating arms to decrease the volume of mixture, or retard the spark; another uses water or other fluid pressure upon a flexible diaphragm, which acts upon the throttle or spark, as the case may be; still others employ other principles of tried and proven merit to restrict the speed of the engine, and thus the speed of the vehicle, to a certain predetermined maximum. This is a quantity which the manufacturer is able to fix, and in so doing, serve the best interests of his clients, as well as himself.

However, many a purchaser loses sight of the fact that this very problem of maximum speed may have been carried throughout the entire design, and that in so altering the machine as to render the governing device futile and useless for the sake of a mile or two more per hour, he is really only paving the way for the quicker destruction of his vehicle. The net result will be a saving throughout the vehicle in upkeep and repair costs, as well as a marked decrease in the fuel and oil bills.

M. C. B. AND THE AUTOMOBILE INDUSTRY

It is well within the memory of many who are now in the automobile business, when railroads were absolutely free from any restraint from the point of view of standard methods. Master car builders (M. C. B.) if they met at all, failed to appreciate the advantages of a standard gauge, crystallized methods of design, and materials of a known desirable composition.

Those of our citizens who object to combinations, as they say, in restraint of trade, have but to slip back to the old and heterogeneous methods of non-standard work, and law will be wholly unnecessary, a combination will be impossible. As a matter of fact all the law in the universe would fail in the face of a 60-inch tread of car wheels on a 54-inch track, nor is this a far-fetched illustration of the variations which obtained but a few years back in railroad work.

History, if it repeats itself, is retarded in its march by the inertia of intelligence, or better yet, by lack of appreciation of known facts. It is a known fact that a standardized method of doing anything is better than a haphazard jump in the dark. Christopher Columbus discovered America against his inclinations; he was looking for India. Had he followed the standarized methods of to-day he would not have been disappointed.

Napoleon Bonaparte, at Waterloo, lost to Wellington, as history relates, because he departed from a standard. The peasant guide who affirmed that the way was level and the going good, did not represent the standard of military intelligence which Napoleon usually relied upon.

I-sections in structural shapes were long ago standardized—why should they not be brought under the same mantle of intelligence when they are employed in automobiles for front axles? The distance between supports is the same in all; roads are no better for one than another; shock is the same for all; a given grade of material is not improved by a difference in the color of the paint, and, when the last word is said, the desire of a designer to be different does not make him right.

Life of tires must be the desire of every autoist. This life is scarcely to be measured in terms depending upon a given size of tire, of a given make, for a given weight of automobiles. Weight alone is not the criterion. If two automobiles weigh the same and one of them is capable of traveling faster than the other, it is morally certain that the tires (of the same size) placed upon the more speedy automobile, will give out much the sooner.

Horsepower rating of a motor is not merely dependent upon the piston displacement under given conditions of compression, considering a given fuel. Rule-of-thumb formula is like "dog French"; were one to inquire for bread in dog French from passersby in Paris he would probably have to fast—adapt the standard and all will be well.

Radiators, of a given make and size, are not likely to work equally well on two different designs of motors. This is due to an entire absence of any standard method of fixing the flame-swept surface in proportion to the compression, piston displacement, etc. A steaming radiator is a most pronounced indication of the lack of a standard.

LICENSED AUTOMOBILE DEALERS ORGANIZE

While nothing was said to so indicate, it was generally understood that the new management of the Association of Licensed Automobile Manufacturers was responsible for the meeting of the New York dealers in licensed cars, held at the Hotel Astor last Thursday afternoon.

Over 20 local dealers responded to the invitation which had been sent out. The meeting was called to order by Sidney B. Bowman, who explained the objects and purposes of the proposed organization. Mr. Bowman's remarks met with the hearty approval of those present and it was decided that an organization should be perfected to include only such dealers as handle cars licensed under the Selden patent.

Percy Owen, of the Carl Page Company, agent for the Chalmers-Detroit, was elected temporary chairman and Mr. Bowman was made temporary secretary. It was decided to form an organization committee to consist of five members, who would also act as nominating committee. The chairman was given power to name this committee and stated that he would do so in the course of two or three days.

The new organization practically means the end of the New York Automobile Trade Association, which has been in existence for several years, as all of the members of the latter body were represented at the Hotel Astor meeting with the exception of four firms. One of the officers of the New York Automobile Trade Association practically admitted that the new organization will undoubtedly replace the older body.

If, as it is said, the A. L. A. M. was responsible for the calling of this meeting, it indicates an entire change of policy from that which was adopted by George Day, the organizer of the Licensed Association. During his connection with that organization Mr. Day discouraged in every possible way the formation of local bodies of licensed dealers undoubtedly under the belief that the individuals would be more easily controlled than organized bodies.

It is understood that one of the purposes of the new organization will be to conduct a campaign of education among the prospective buyers of cars, drawing attention to the Selden patent and the alleged liability of suit to those who purchased unlicensed cars.

Among those present at the Hotel Astor meeting were:

Sidney B. Bowman, George Johns, Col. K. C. Pardee, C. A. Duerr, Gen. John T. Cutting, J. Joyce, Carl Page, Percy Owen, Charles A. Singer, Jr., George W. Bennett, John F. Plummer, Fred Titus, W. H. Hurlburt, I. N. Uppercue, C. W. Wurster, E. Day, Robert Slusser, Ferdinand Cimiotti.

INTRICATE PROBLEMS INVOLVED IN SELLING

With an increase of 130 per cent. in the production of cars during 1909 over 1908, taking the licensed situation alone, it is necessary to seriously consider one or two of the phases among which the question of the future disposition of second-hand (used) automobiles is bound to float to the top. It has long been the practice of the selling representatives for the various makers, to take in trade used cars of their own make and allow something for them on account of the new purchase. That they will continue to do something of this kind is very likely, and it is even possible to foresee that it may be advantageous to any maker of automobiles to father the used cars of his brand rather than to allow them to become as "flotsam and jetsam," kicking about under the heels of the buying public, offering false ear marks which will reflect seriously upon the quality of all automobiles of the same make.

One way which has been suggested by a very fair-minded builder of automobiles is to organize a series of repair shops and more or less supervise their operation, placing the used automobiles in hand for repair and permitting the repair shops to realize a profit consistent with the troublesome work.

Waverley Electric Roadster

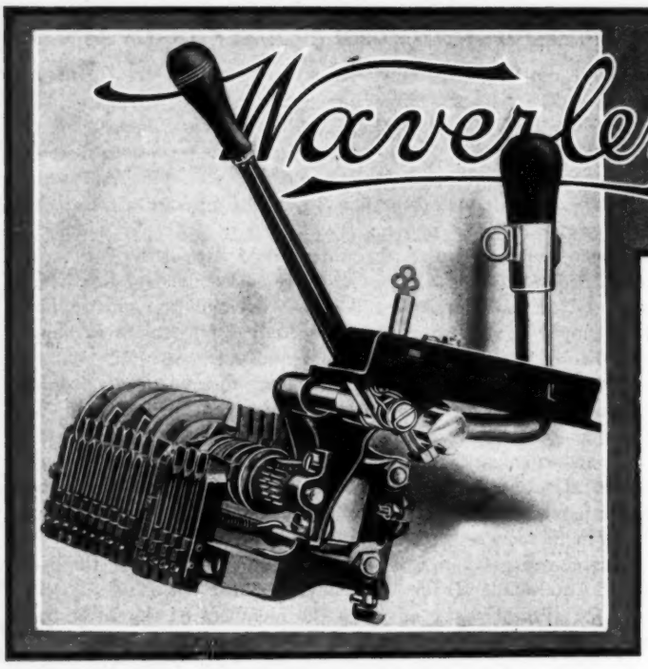


Fig. 1—Knife edge revolving controller as used on Waverley electrics in conjunction with Type H motor

GRADUALLY the general appearance of all mechanical modes of transportation verges towards a common standard, and the chances are that in the long run they will all look very much alike, if, indeed, agreeably to locomotive practice, they may not all be substantially the same, unless, perchance, there may be some four or five separate schools of design, each one persisting in some one method.

The new Waverley electric roadster, as it is offered this year, is interesting from the point of view of standardization, as well as to the patrons who prefer an electric vehicle to a gasoline automobile. That there should be just such preferences is to be readily taken for granted, due to the splendid utility of electrics, despite the greater radius of action of gasoline equipment.

BATTERY IN FRONT UNDER THE BONNET

The Exide battery, of 32 cells, each with 11 plates, is placed under the bonnet in front, just as the motor is there placed in gasoline work. It is something of an advantage, according to the maker, to thus have the battery in a perfectly accessible position, due to the facility with which the cells may be examined, the specific gravity of the electrolyte taken, and if necessary, remove the battery for the purpose of making repairs.

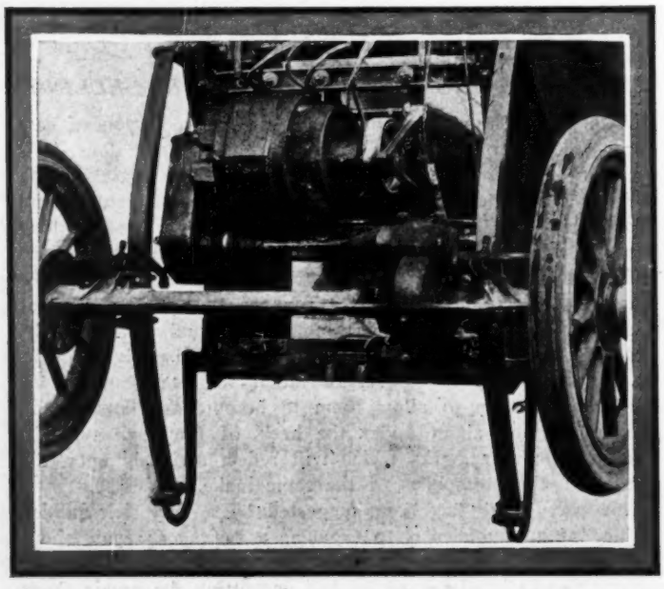


Fig. 2—Depicting relations in the swing of the power plant to the rear axle

The body of the chassis is 108 inches long, with a wheelbase of 94 inches, and the tread is 54 inches. The body is commodious, with inside measurement of the seat of 38 inches; the color is gray. A tilted steering wheel of the irreversible type, brings this part of the vehicle up to standard automobile practice, while the motor suspension is that usual in Waverley practice, as depicted in Fig. 2. This suspension has served for some time in the several types of vehicles of this make, and, besides being noiseless it has the faculty of delivering the power with a minimum loss as the characteristic Fig. 3 adequately indicates.

TYPE "D" CONTROLLER FOR CONTINUOUS TORQUE

In order to limit "drop" in the controller, thus safeguarding the commercial efficiency of the whole equipment to a considerable extent, the controller is so made that the "wipe" principle of contact assures high electrical conductivity across the joints. This is accomplished by having a central revolving core upon which is mounted a series of properly contoured knife-blade members which press between contact pieces which, in turn, are formed out of suitable grades of copper in sheet or strip form, securely fastened and held in rigid relation so that the knife blades pass between each pair of the fixed members and pry them apart sufficiently far to enable the core to rotate and make the respective combinations.

The "make and break" system of control is adopted in this system; the idea represented is to maintain a constant state of torque during the period of acceleration of the vehicle—just when torque is most in need. The controller is contrived to give four forward, and as many speeds in reverse, but in order to assure safety in the hands of the least experienced, an interlocking device is applied with advantages as follows:

(a) Direction cannot be changed while the power is on.
(b) The vehicle cannot be started in either direction, unless the lever is at the neutral point.

The controller is compact, well designed to stand the continuous working, and the connections of the wires from the motor and battery are so securely made that they will neither come loose or impose a high resistance to the electrical current. The wiring system is also most carefully executed, large sizes of wire are used to limit "drop," that is, the loss of voltage in the wiring is reduced to a nominal point by the proper grading of the sizes of wires used in the several branches. The wiring is also accessible, which is a point of importance, and too, the insulation is acid resisting, and so placed that the fumes from the battery cannot contact with the wiring.

TEST SHOWS ECONOMICAL CONDITIONS

It is of the greatest importance to conserve the energy in the battery for two reasons:

(a) The radius of travel of the automobile will be so much the greater.

(b) Life of the battery will be augmented; the life of any battery is in direct proportion to the number of discharges to which it will be subjected under a fixed set of conditions.

The curve, Fig. 3, was taken expressly for THE AUTOMOBILE in order to permit of a definite statement of the relating facts, it being the idea to display a proper regard for truth in dis-

cussing a matter of such great importance. In this chart the current in amperes is written as ordinates, and abscissa are given in four figures in order to express all the conditions.

A careful study of this chart will disclose divers points well worth knowing in relation to electric motors as they are applied to automobile work, as for illustration, it will be seen that the curve of efficiency is almost flat top between 20 and 120 amperes of current; it raises from 20 to a miximum at 35 amperes, but at 120 amperes the efficiency is no lower than at 20 amperes of current intake of the motor.

The speed of the motor is maximum at minimum load, which is to be expected since the motor is series wound, and, as to the speed variations, they range from 1,640 at 33 amperes, which is the point of maximum efficiency of the motor, down to 400 revolutions per minute when the load is such as to draw 120 amperes of current from the battery.

Referring to the torque, it is 74 at 120 amperes and 22 at 60 amperes of current, this curve of torque proves to be particularly desirable for work of this character, it being true, as a rule, that power of electric motors is a rapidly falling quantity as the load increases beyond a certain point.

The speed of the car in miles per hour, changes as the load increases, which is true when a car is required to make a grade or if the road is not hard and level. All motors do not perform in like manner in this regard, and, as to this particular motor the performance is plotted in the curve to show result as follows:

RELATION OF SPEED TO CURRENT IN AMPERES

Current in amperes.	Speed in miles per hour.
20	30.8
30	23.8
40	18.6
50	15.0
60	12.6
70	11.0
80	9.8
90	7.8
100	5.9

This interpretation of the chart as it tells about speed of the car for current consumption, is the real story of the efficiency of the whole, and, as an inspection will disclose, the speed falls to about 1-6 of the initial speed while the current in amperes increases in the ratio of 1:5. There is one other point which will tell of the mechanical efficiency of the whole; the curve of speed in miles per hour, while it shows a falling off as the load is increased for any cause, sustains to a remarkable degree, and fails to recede enough under increasing load to allow criticism.

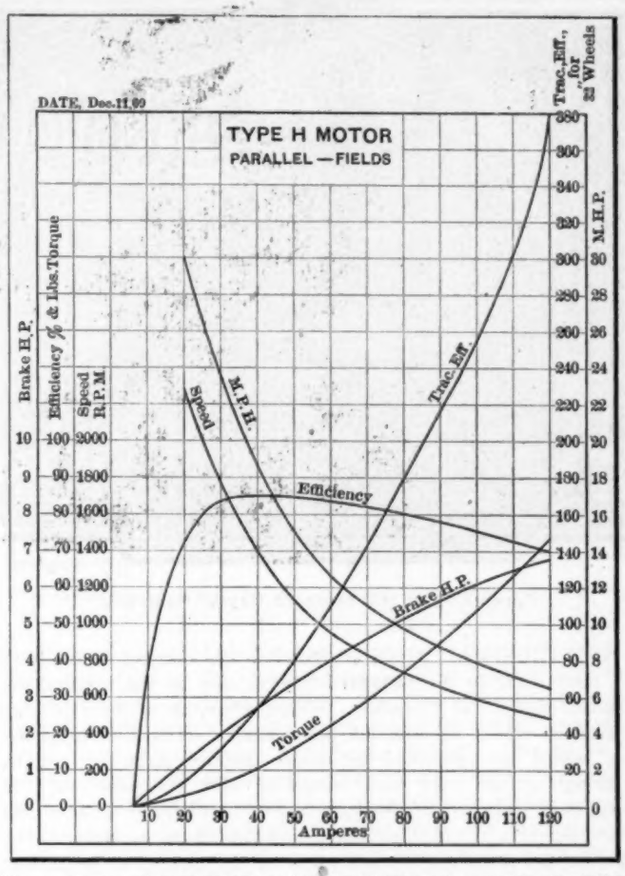


Fig. 3—Curve of performance of Type H Waverley motor, depicting a fine relation of torque to current in amperes

Were the motor inefficient at all speeds, which does not happen to be true, one would be inclined to look for high fixed losses. These fixed losses would be due to friction, hysteresis losses in the armature core, focault currents, possible in the polar horns, and to heat losses from all possible causes. A well-balanced motor is what is desired, in which the I^2R losses must also be carefully limited—this characteristic, as presented in the curve, is of just such a well-balanced motor.

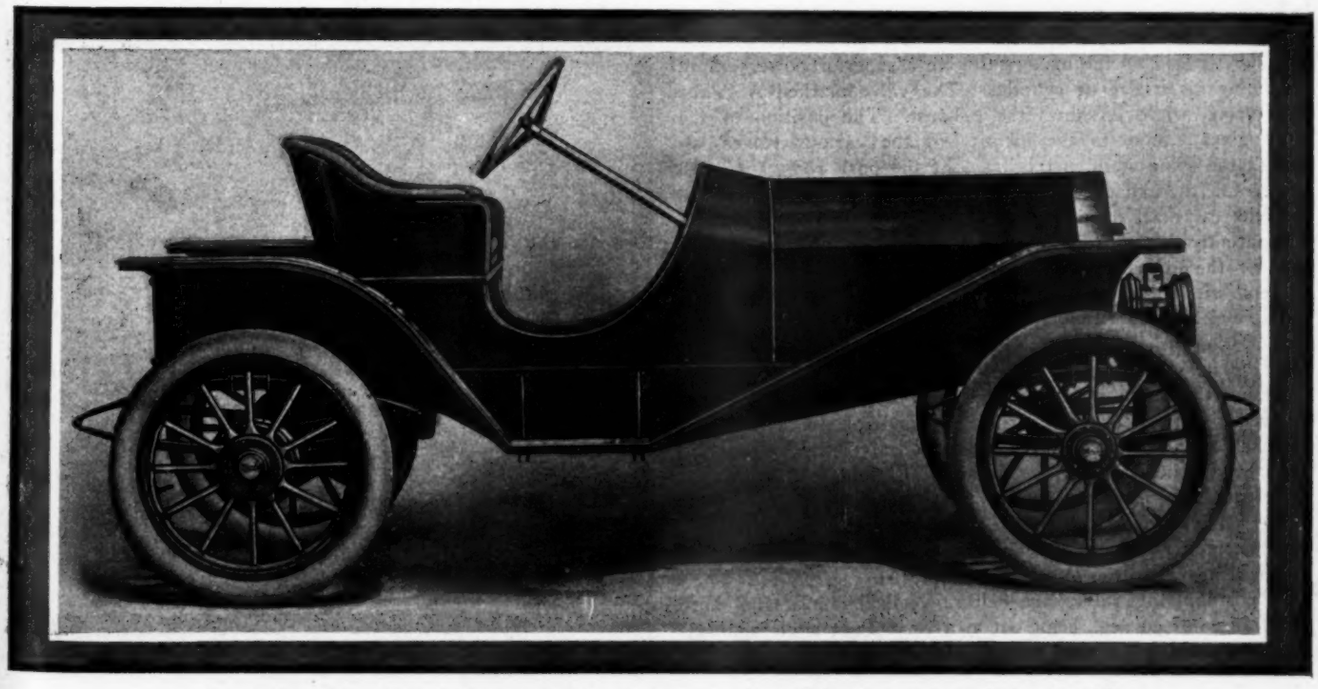
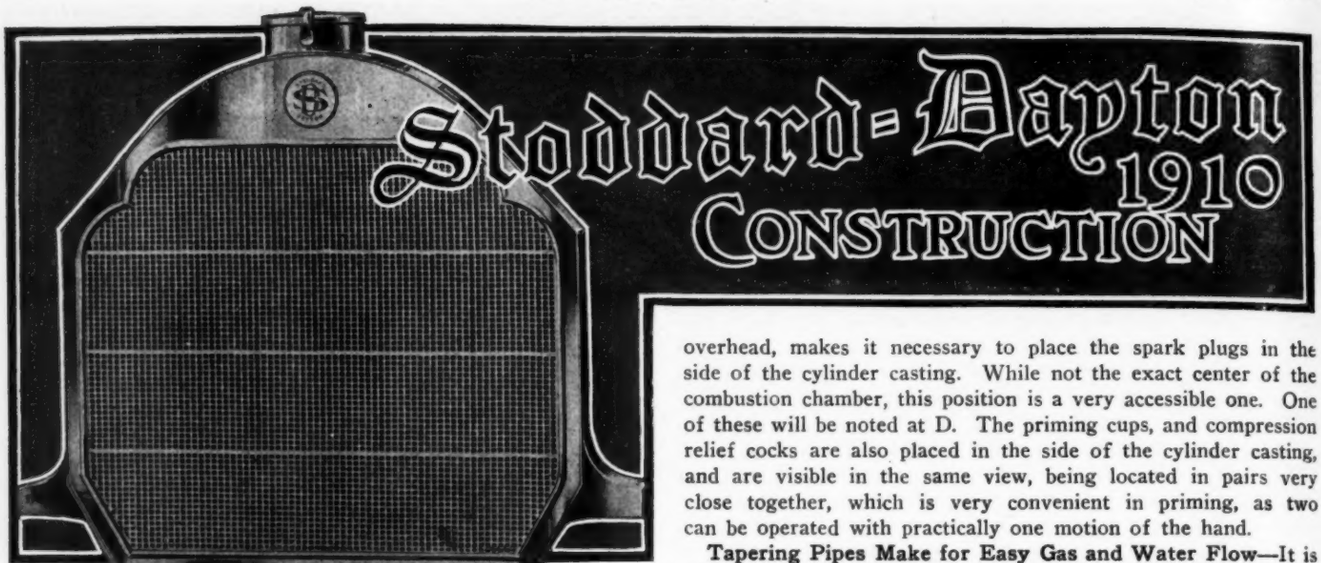


Fig. 4—Waverley electric for 1910, showing lines similar to roadster types of gasoline automobiles



Appearance of 1910 Stoddard-Dayton Radiators

INFINITESIMAL would characterize the changes which have been made in the Stoddard-Dayton cars by the makers, the Dayton Motor Car Company, Dayton, Ohio, to fit them for the season of 1910. All told the line includes seven different chassis, which are powered by three distinct sizes of engine. Throughout the 1910 line, compared with the same cars as they were equipped in the past season, a longer wheelbase and more power are found to affect each and every model. To be specific, the three engines are rated by the makers at 30, 40 and 50 horsepower, respectively. The wheelbase of the 30 horsepower car is 108 inches in all models. The 40 horsepower types, on the other hand, all have a wheelbase of 116 inches. Then, with the still higher powered engine, a further increase is noted to 120 inches except in the 7-passenger touring body, the limousine, and landaulet enclosed cars, where the figure reached becomes 128 inches. The latest addition to the line is a speed car of 60 horsepower, which chassis has a short wheelbase of 106 inches. In addition to these, a town car will be put out, using the 30-horsepower chassis with 108-inch wheelbase.

Overhead Valve Arrangement Retained—Noticeable first in looking at the engine views is the retention of the overhead valves. This position, in combination with a spherical combustion chamber, is said by the makers to give a superior power output from any given size of cylinder. The valve marked A is the inlet valve, while B shows the exhaust. The position of the pipes gives a clue to the identity of the various valves, although the same could not be said of the push rods, for, with this motor, the exhaust camshaft is located on the inlet side, and the inlet camshaft on the exhaust side. So, it is that C, which is apparently the inlet push rod, is actually the push rod mechanism for the exhaust valve on the opposite side of the engine. An end view would show this construction, the rocker arms above, which operate the valves, and which are themselves operated by the push rods, cross one another above the cylinders.

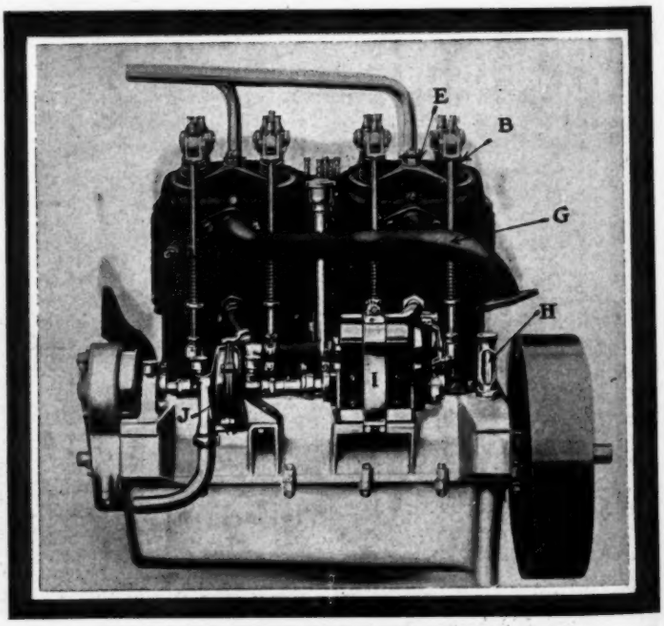
In looking at these two views of the engine, the method of fastening the valve cages in place will be noticed. This is a screwed-in fitting for the cooler and less liable to distort inlet valve cap, while the other, the exhaust valve cage, is held in place by a yoke. These yokes, marked E, hold each, a pair of valve cages, the loosening of a single nut sufficing to loosen and allow removal of a pair of cages. Since the exhaust valve requires grinding in more often than the inlet, this feature is one that will appeal to the experienced motorist.

In position, the valves are neither vertical nor at the more usual angle of 90 deg., being set at a very slight angle approximating 35 deg The use of the two valves in separate cages overhead, makes it necessary to place the spark plugs in the side of the cylinder casting. While not the exact center of the combustion chamber, this position is a very accessible one. One of these will be noted at D. The priming cups, and compression relief cocks are also placed in the side of the cylinder casting, and are visible in the same view, being located in pairs very close together, which is very convenient in priming, as two can be operated with practically one motion of the hand.

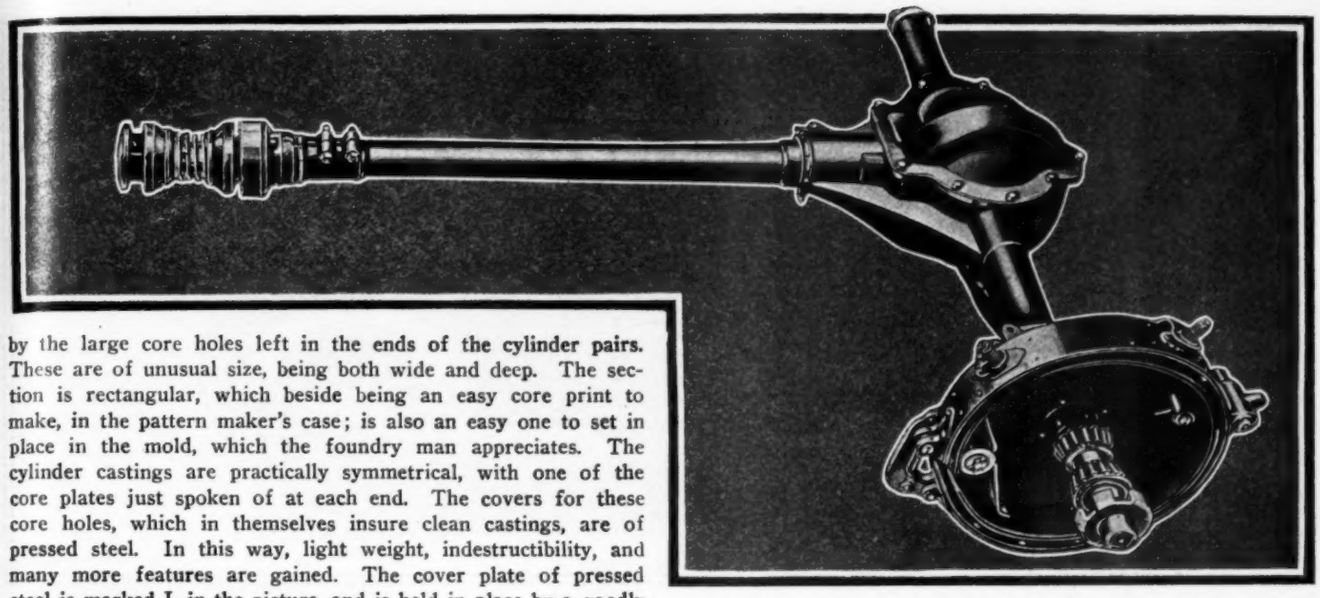
Tapering Pipes Make for Easy Gas and Water Flow—It is in the attention paid to little, but important, details, which shows the desire of a maker to improve his product, and in this particular case, several tendencies of this sort may be remarked about without harm. Thus, a glance at the exhaust side of the motor will suffice to show the tapered water pipe, which allows the two converging streams of outflowing water plenty of room. This is effected by an expansion of the diameter of the pipe just before the point of convergence of the two streams, that is, just before the first cylinder is reached, as shown at F.

This same side of the motor shows a similar scheme carried out on the exhaust pipe, which is exhibited at G. Without a doubt, the latter is of equal importance with the former, for the quicker the cylinders are cleared of the burned and thus, useless gases, the greater will be the power development. The pipe expands to a larger diameter just ahead of the second cylinder pairs—for this is the way they are cast. The short length of expanded diameter ahead of the second pair should have a muffling effect on the waste gases from cylinders one and two. This exhaust pipe is bolted up in place by means of a flanged connection, two bolts per flange being used. This allows of removing the pipe in its entirety without touching anything else, and with very little work or fuss.

Cylinders Cast in Pairs with Large Core Plates—The convenience of the foundry is taken care of in a suitable manner,



Exhaust Side of Engine Carries Magneto and Pump

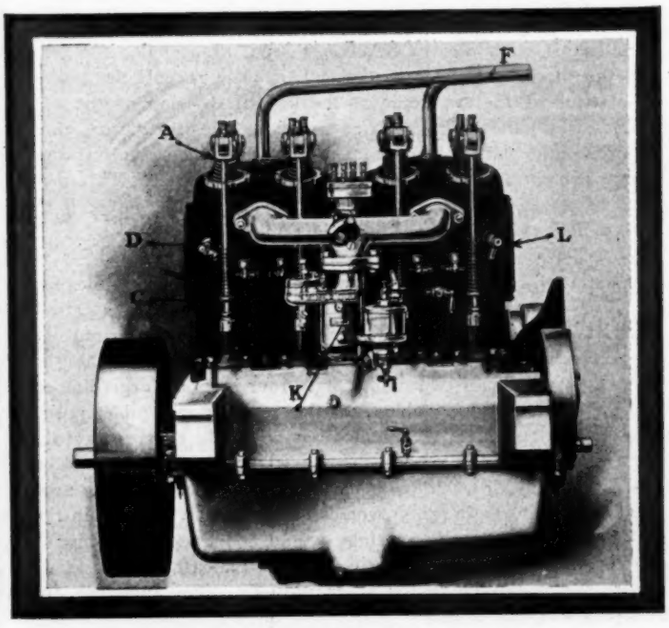


Construction of Stoddard-Dayton Rear Axle and Torque Rod

by the large core holes left in the ends of the cylinder pairs. These are of unusual size, being both wide and deep. The section is rectangular, which beside being an easy core print to make, in the pattern maker's case; is also an easy one to set in place in the mold, which the foundry man appreciates. The cylinder castings are practically symmetrical, with one of the core plates just spoken of at each end. The covers for these core holes, which in themselves insure clean castings, are of pressed steel. In this way, light weight, indestructibility, and many more features are gained. The cover plate of pressed steel is marked L in the picture, and is held in place by a goodly number of small diameter button-head cap screws, with a gasket below for water-tightness.

Aluminum is the material of the crankcase and covers. The case is parted laterally along the center line, forming an upper and a lower half, which are bolted together. The lower carries the oil well (variously called sump, compartment, and oil pan), and is of simple yet rigid shape. The upper half, on the other hand, supporting as it does all of the accessories, is necessarily more work for the foundry. The supporting arms, four in number, two on each side, are of a box shape, a small internal opening being left for lightness' sake. A pad for the pump support, and a small shelf for the magneto's resting place are found on the left side of the upper half, while the front end carries the inner, deeper half of the gear case. This reduces the cover for the gears to a simple plate, of nearly clypeate form held by eleven bolts. The single projection through this plate is the starting crank, which is surrounded by a packing nut or gland, threaded into the case. There is, then, nothing to oppose the work of removing the cover, for inspection or repair.

Carbureter Very Accessible, Too—The gears, valves, pipes and other parts, which have been described are not alone in possessing the desirable quality of accessibility, for the carbureter is a part which has had a maximum of consideration in this line. It is of the separate float chamber, Venturi tube type, with an auxiliary air adjustment. The float chamber has a glass body, which permits one to watch the action within and ascertain if the vaporization is proceeding properly. One innovation is the location of the throttle valve. This, instead of being an integral part of the carbureter, is carried up higher and fills the space at the parting of the inlet pipes, the nearest to the cylinders, which it would be possible to have it. After passing through the throttle, then, the carburetted air has a straight passage to the cylinder pairs. Moreover, the inlet pipe, is as short and compact as possible. The removal of two bolts, and the severance of the gasoline line—fitted with a union for this purpose—allows of the whole vaporizer being picked out bodily.

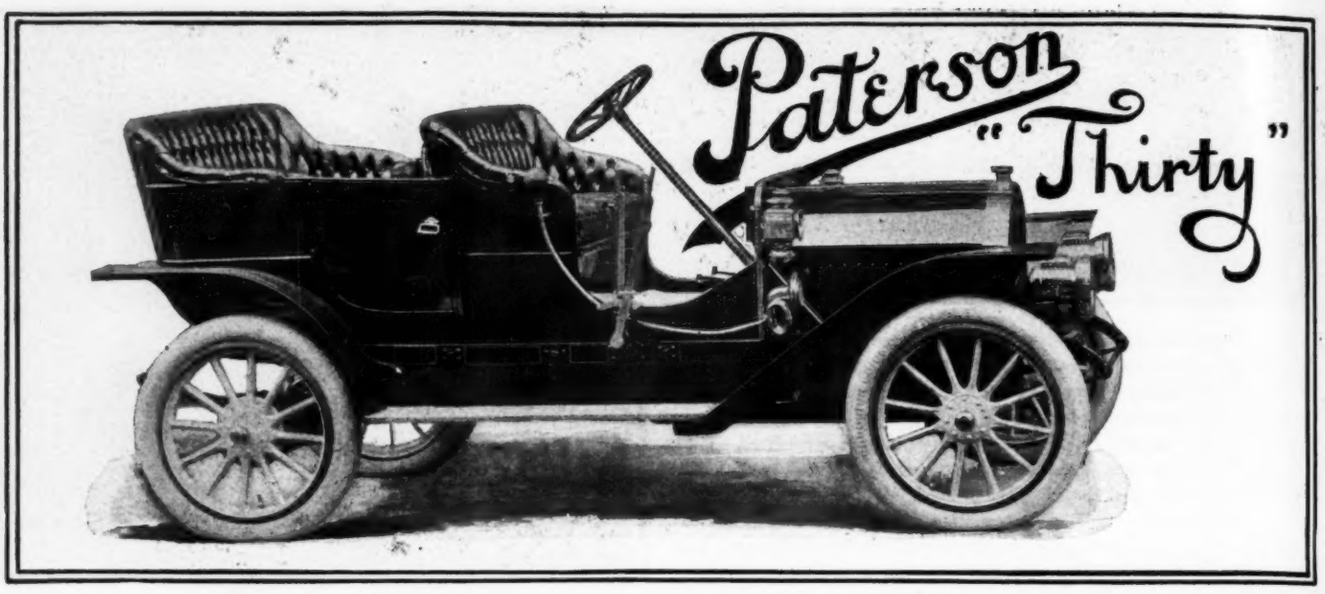


Inlet Side of Engine Reveals Carbureter

The magneto, too, is fixed up in a similar manner. The drive is through an universal coupling (with a shearing member, by the way), and is held to the case by a strap. Loosening this strap, disconnecting the wires, and pulling the magneto out backward, so as to separate the two component parts of the universal coupling, and the current system is ready for inspection.

Forward of this, and on the same side of the engine, is the pump of the centrifugal type. This, too, is driven by a shaft in which is located a universal coupling to allow ready removal. The water piping might be accurately described as "short and sweet," for there is but one straight, short horizontal pipe from radiator to pump intake. From the outlet above and on the cylinder side the discharge flows through a Y-shaped pipe with one branch somewhat elongated. Hose connections are used freely, but this is desirable as it makes for removability. The pipe from the radiator is free from the bends which set up much internal surface friction, hence the water flows easily, the friction component being small.

Speaking of radiator, this shows one of the few changes of the whole car. Whereas formerly of the tubular type, it now has the more popular cellular form. The shape, however, is unchanged, while the same might be said of the filling cap. The latter with characteristic Stoddard-Dayton accessibility written all over it, has been freely copied, being of a long, narrow, common-sense shape, which allows one to pour into it directly from any kind of a pail, without first hunting up a funnel. The fastening for the radiator cap is good, also. Being hinged at the back, it is only necessary to hold the front edge down. This is done by means of a crooked lever, which is spring held in an upright position. To open, the lever is pulled forward past the center of the spring-holding device, when the force of the spring acts to hold it down.



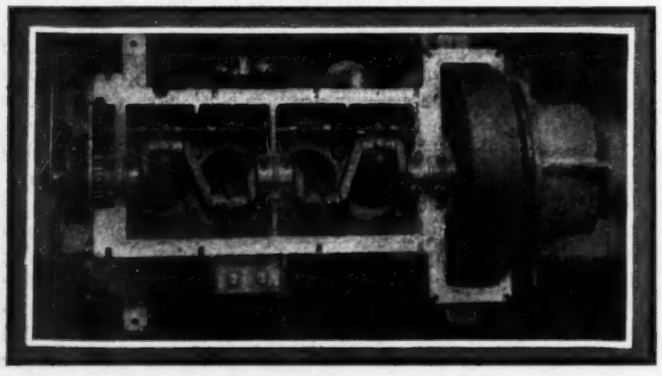
Full Side View of the Moderate-Priced Paterson Thirty Shows Excellent Proportioning of Parts

SPECIALIZATION marks the attack upon the present automobile situation of the W. A. Paterson Company, Flint, Mich., which concern is bringing out for the approval of America's shrewdest buyers, a machine which will be in the so-called $1,500 class. A single thought will suffice to show that this specialization is wise, for the class entered is well filled with a representative lot of cars from a very active group of manufacturers. At the price set, $1,400, and in view of the worth of the car, as it will be described herewith, it is apparent that the proper share of the business will come the way of the makers of the Paterson "30."

In specializing upon this one chassis, the maker is able to give his undivided attention and that of his entire factory personnel to this one unit, its perfection, refinement, production on specified time, and many other items which, small at first glance, loom up large in the long run. For the differing tastes of differing personalities, three distinct bodies will be fitted to the one chassis, a five-passenger touring car, demi-tonneau and tourabout. The price of this model with either the touring car or demi-tonneau body is $1,400, while the tourabout sells for $1,285. The equipment includes the full set of lamps with generator, magneto, robe and foot rails.

From the cuts of the power plant and chassis herewith shown, one will at once see that the aim of the Paterson Company in designing this car was simplicity, compactness, and at the same time, to make this car one of high efficiency.

Details of the Unit Power Plant—The motor, clutch and transmission form a single unit, and all working parts are enclosed in a single case which thoroughly protects it from dust. This construction is the best and most up to date for small and medium-sized power plants. It eliminates all possibility of parts getting out of alignment through road shocks, etc. This entire power plant rests on a pressed steel subframe and can be removed by simply taking out four bolts.



Crankcase Viewed from Below with Cover Removed

What the Motor Shows—The cylinders are cast in pairs made of close gray iron and finished by grinding to assure accuracy. The pistons are ground to size and fitted with three rings ground on sides to fit the grooves in the pistons. Valve heads are of nickel steel with carbon steel stems and ground to size; valves, which are adjustable, are large and located all on one side. Valve ports, through which the valves are removable for grinding, are closed by screwed-in plugs, those over the inlet valves being threaded internally for the spark plugs. The connecting rods are drop forgings, crankshaft bearings and connecting rod bearings are made in two halves and are easy to adjust. The crankshaft is a heat-treated, open-hearth carbon steel drop-forging; bearing surfaces are ground. Both the crankshaft and the camshaft are carried in three bearings and are supported by the upper half of the case.

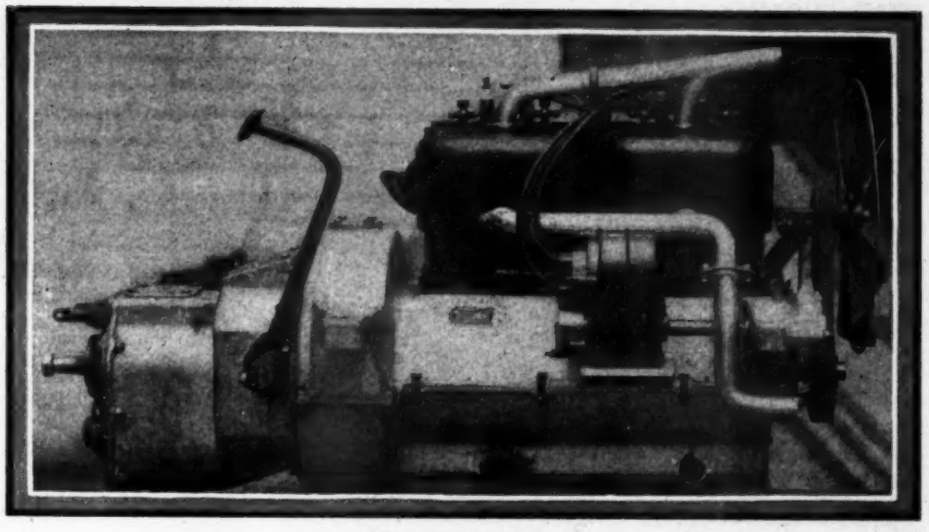
Elsewhere on this page will be found a picture showing this. It is a view of the engine from below, with the lower half of the crankcase removed. The shape and comparative size of the crankshaft parts are to be clearly seen, as are also the length of the three bearings provided. This view reveals, in addition, the shape of the crankcase at the line of division of the upper and lower halves, which is, as usual, at the center line, and in a horizontal plane. The gears are set into the part of the gear cover which is integral with the front of the case. This makes an accessible and convenient arrangement, for the cover is then but a flat plate, easily and quickly removed.

The housing for the flywheel, too, may be discerned, as well as the four bolt holes, the occupants of which retain the upper and lower halves of the same in juxtaposition, and retain the lubricant within where it is useful, instead of allowing it to slowly leak out, where it is of no use. Each of the three crankshaft bearings is provided with four bolts of large diameter, which bolts are removable and, the reverse, insertable, without the lower cover. Any automobilist who has ever struggled to line up the bearings of a crankcase which had the two end caps an integral part of the lower half of the case will at once appreciate that this is a big improvement. Not that it was put in there with the idea that the bearings would soon need scraping; far from it, the material used being a hard, die-cast babbitt.

In operation, the motor is exceedingly quiet and free from vibration. The magneto is located on the right-hand side of the motor and is driven by enclosed gearing.

Lubrication is of the "constant level splash system." The oil reservoir at the bottom of the crankcase is filled with oil, this oil is forced from this reservoir to the crankcase by a plunger oil pump of large capacity. The amount of oil in the reservoir is observed through a single float oil level gauge.

Water circulating is by thermo-siphon circulating system, all pipes and passages are large to assure a quick and easy passage of water, the inlet and overflow water pipes are of polished aluminum. Large water jackets are provided and the radiator is of large capacity. The cooling fan, which is large and well designed, is driven from the crankshaft by a flat belt. From the view of the magneto side of the engine the simple and convenient belt tightener is clearly shown as well as the fan.



Unit Power Plant Viewed from Magneto and Water Piping Side

Points of Worth in the Transmission Mechanism—The clutch is of the cone type. It is positive, but engages gently. The face of the cone is fitted with renewable leather lining, with springs under the surface of the leather to insure easy engagement. This clutch transmits directly to the main shaft of the transmission. The transmission is the selective type, with three speeds forward and one reverse, gear, shafts run on annular ball bearings. Power is transmitted from here to the rear wheels through two universal joints, a carbon steel propeller shaft, and the usual differential. The rear axle housing is composed of heavy steel castings and tubing, with axle shafts running on Hyatt roller bearings. The two sets of brakes are large and act directly on the rear wheels, one set are external contracting, and one set internal expanding.

Tubular describes the front axle, a tube of large diameter, and of heavy gauge, having the drop-forged yokes riveted and welded to it at the two ends. The cross rod is placed at the rear of the axle out of the way of road obstructions, while the connecting link to the steering gear is above the knuckles. The axle is dropped at the center slightly for look's sake, but the cross connection is left straight, the straight form being better in that it is better able to withstand tension than would be a false shape, such as a long radius curve. Since this member is one which is essential to the safety of the occupants of the car, and since it is always under more or less tension, the idea is an excellent one. In addition to the yoke ends of the axle, the steering knuckles and all connections are drop-forgings. The front axle runs on annular type ball bearings.

Pertinent Facts About Spring Suspension—Comfort is assured by the use of good springs, well selected for length and type of spring, as well as the material entering into their composition. The front springs are semi-elliptic, and rather flat. They are fixed at the front end, while the rear end is shackled. Side sway due to unusual flexibility of the front springs is reduced to a minimum quantity by a cross rod joining the two front spring hangers. This serves a double purpose in that the frame there is stiffened also.

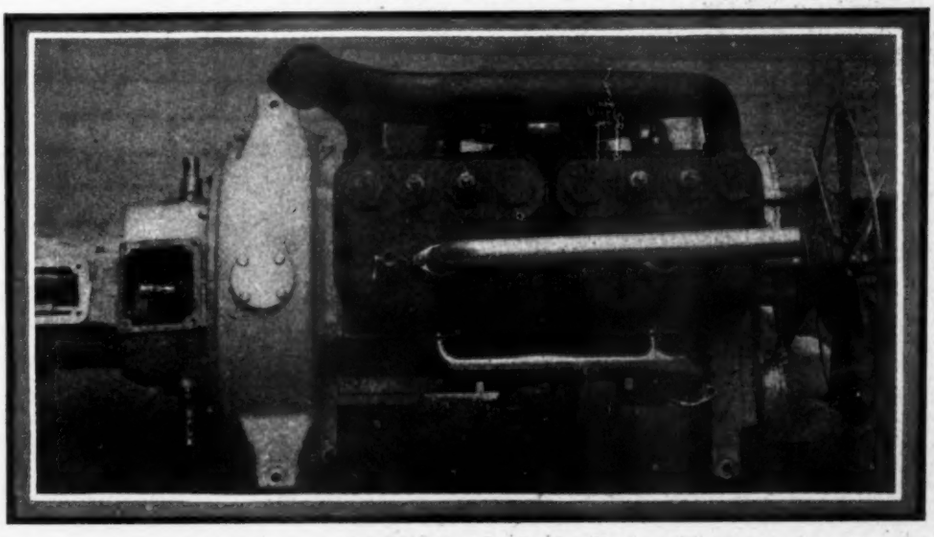
Rear springs are of the full-elliptic type, fixed to the upper side of the axle. All spring eyes are provided with grease cups, which lubricate the moving surfaces, a simple twist with the fingers each day serving to conserve the life of these important members and to eliminate noise.

A pressed steel frame of channel section is used with a sub-frame of the same material, the latter being reinforced, however, by means of a filler strip of ash. The open side of the frame is turned in, while at the front it is narrowed to permit of a much extended turning radius.

The usual tread is used, 104 in. wheelbase, 32 by 3½ in. tires all around, and the weight is given as 2,000 lbs. The tire equipment is worthy of more mention, in that the universal size reduces the extra tires to be carried on a long run to one, since this one will fit any one of the four wheels.

At the A. L. A. M. rating, this motor, which is of 4-in. bore by 4-in. stroke, rates at 25.6 horsepower, but the makers state that every engine sent out from the factory develops actually about 30 horsepower.

At the rating power development, the ratio of power to weight, that is the weight per horsepower is but 78 pounds, which is a comparatively low figure. But, even this is materially lowered when the actual amount of power developed is taken into account. Then the figure becomes 66 pounds, which even with the full rated load of passengers, would not possibly increase to over 75 pounds per horsepower. When this ratio is low, as in this case, high speed, hill-climbing ability, and other useful features are assured.



How the 25-Horsepower Engine and Unit Power Plant Look from Above

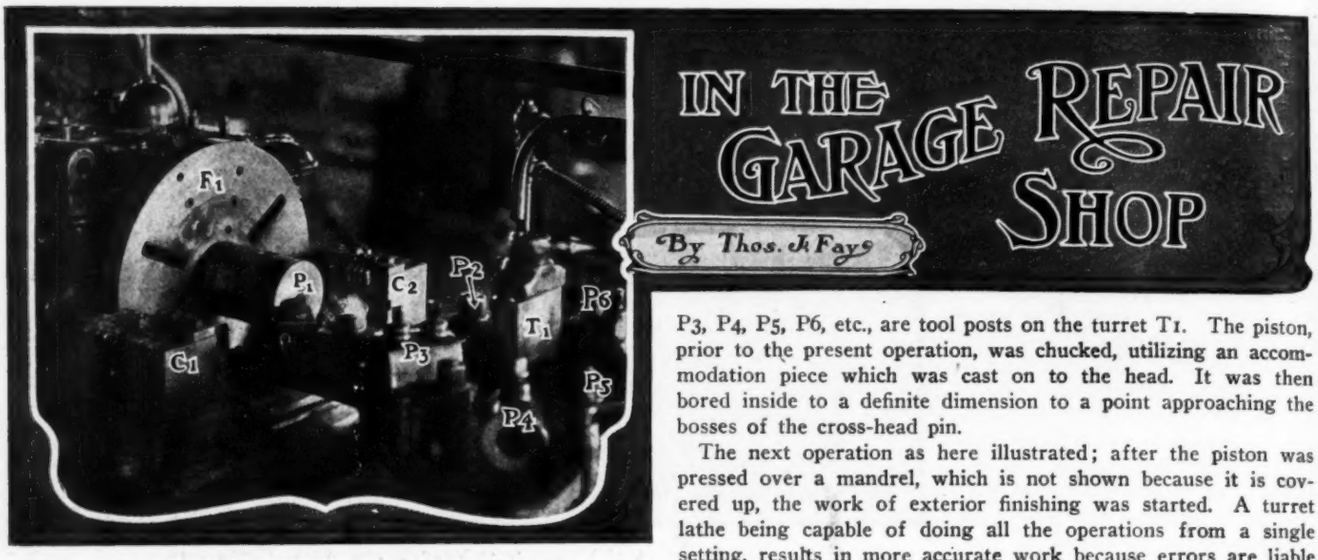


Fig. 1—Turret lathe working on pistons, many different operations being done at once

IT is very likely true that few of the relatively small garage repair shops will be fitted out with a large turret lathe, as shown in Fig. 1 (title illustration). New shops just fitting out might very well consider the excellent advantage of tools of this character, if they are large and substantially constructed.

In garage repair work new pistons have to be made quite frequently, and the figure is an illustration of a piston being finished on a turret lathe, in which F1 is the face plate of the lathe, P1 is the piston, C1 and C2 are side cutting tool holders, and P2, P3, P4, P5, P6, etc., are tool posts on the turret T1. The piston, prior to the present operation, was chucked, utilizing an accommodation piece which was cast on to the head. It was then bored inside to a definite dimension to a point approaching the bosses of the cross-head pin.

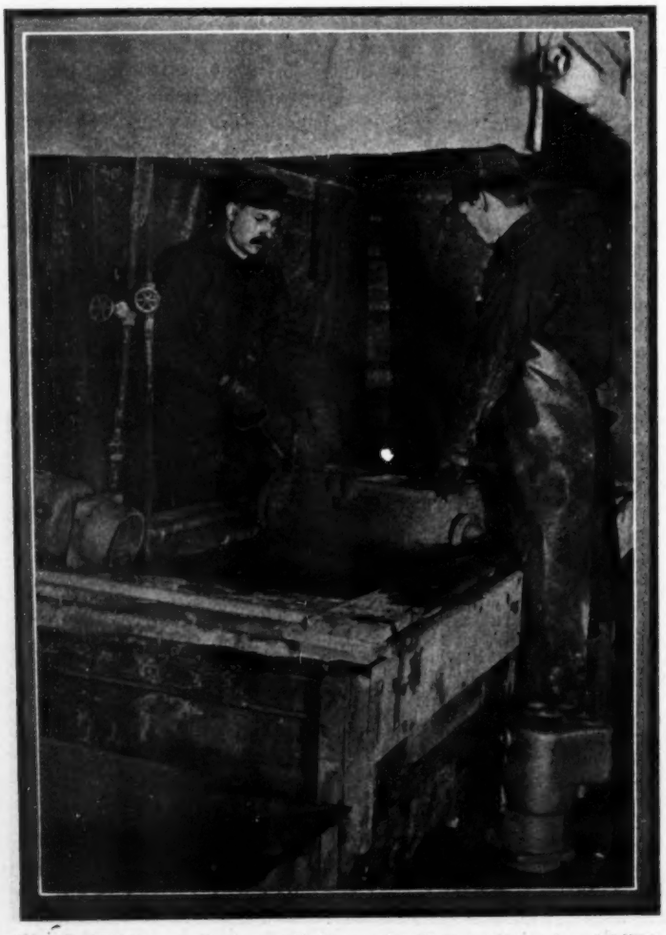


Fig. 2—Workmen dipping cylinder and other castings in pickling vat, previous to machining operations.

The next operation as here illustrated; after the piston was pressed over a mandrel, which is not shown because it is covered up, the work of exterior finishing was started. A turret lathe being capable of doing all the operations from a single setting, results in more accurate work because errors are liable to creep in during the setting up operations. As the work is here presented, the exterior of the piston is turned off, the grooves are completed and the finishing operation of the surface of the head is shown, nearly completed.

In the normal course the next operation would be to drill for the cross-head pin, which is also capable of being performed in the same turret tool, which would bring the repair man up to the question of the hardened cross-head pin, which would have to be a press fit in the piston. This question of hardening is of sufficient importance to merit some discussion and will be taken up here, while the opportunity affords, with the hope, perchance, that chameleon methods involving cyanide of potassium will not be inflicted upon the owner of the automobile.

Nearly every workman who has had to do with repair work is imbued with the idea that he has a secret process which, if used, will make the parts everlasting. Against this is the avowed declaration of every metallurgist in the world whose reputation is worth considering, that there is no quick and simple method by which case-hardening can be accomplished with any degree of certainty excepting under conditions as follows:

(A) The material must be of a cementing character.
(B) Time is essential to the success of the process.
(C) The "cement" must be efficient for the purpose.

THE PRINCIPAL CHARACTERISTICS OF CEMENTING STEEL

When steel is cemented (case-hardened) the process has for its purpose the carbonization of the exterior, leaving the core as originally constituted. The reason why it is desired to carbonize the surface is because if the carbon is not in sufficient presence the surface will not be rendered hard in the quenching process. The reason for desiring a soft core is to eliminate the ills which are always present if high carbon obtains throughout the section. Were it not for this latter consideration it would not be necessary to case-harden at all, since the steel might be purchased of a character holding high carbon, and it would be rendered hard by the simple process of heating it to the desired temperature and thereafter quenching it in a suitable quenching bath, of which there are a number of choices as follows:

QUENCHING BATHS IN ORDER OF MERIT

(A) Mercury
(B) Acidulated water, ice cold
(C) Salt water, ice cold
(D) Salt water
(E) Solution of water and skimmed milk
(F) Lime water
(G) Fish oil
(H) Cod liver oil.

These solutions are in order of merit as respects their respective actions on the steel, but not in the order of merit from the point of view of general utility. Mercury for illustration, is

a most dangerous metal (in liquid form) to utilize in any heat-treating process, because mercurial fumes are frightfully poisonous and no matter how good the equipment used may be, even if it includes a well-installed exhaust fan, mercurial poison will ultimately affect the operator. For very small parts which are to be intensely hard a bath of mercury properly regulated may be occasionally used with impunity and the degrees of hardness of the quenched small parts will be in keeping with the most exacting needs. When the parts are of considerable mass, thus holding a high value of the heat units to be dissipated, it becomes necessary to utilize a safer quenching bath, and if the steel is of a water-quenching variety it is then possible to resort to the use of water either acidulated or saline.

Ice will go a long way toward maintaining a constant temperature of the water, particularly if the water is agitated during the quenching operation, but taking it as a whole, it is not quite up to the standard which is set in manufacturing plants, where heat-treatment processes have assumed all the proportions of a high art. In these large plants where the quenching operation is conducted with the utmost care, the baths are piped for air under pressure, and a nozzle is placed on the end of the submerged pipe so that when the air valve is opened which permits the air pressure to enter the bath, two ideas are satisfied:

(A) The liquid is refrigerated through the process which produces a lowering of the temperature when a gas (as air) is expanded from a sufficiently high pressure down to the atmospheric pressure.

(B) The exuding air agitates the water or other liquid violently and the vapor globules which form on the surfaces of the parts undergoing treatment are brushed off, due to this agitation, so that the quenching process is completed with the utmost dispatch.

Air to serve as a refrigerant must be expanded from a temperature above 60 pounds per square inch, and it might be advantageous to have this temperature even as high as 100 pounds per square inch. There are very few garages which are not equipped with compressed-air machinery, it being used for the purpose of storing air under pressure in order that it will be available for pumping up tires. This pressure is generally 80 pounds per square inch, and a line leading from this tank to the quenching bath in the repair shop will scarcely have to be with a large diameter pipe, and the results which will be realized will be far beyond the average expectation.

TWO GRADES OF CEMENTING STEEL TO CONSIDER

If the parts to be hardened are to have dual characteristics as highly kinetic and what the German calls "tough hard" the quenching bath will naturally be oil; cotton seed oil is much used in this class of work. Quenching in oil, however, does not produce a glass-hard surface, and if such is desired, cold salt water will be more nearly right. On the other hand, if the steel is not suitable for water-quenching work, the results will be disastrous, particularly if the work includes intricate shapes.

The real difference between the cementing steel which is serviceable for water-quenching and that which might work satisfactorily under conditions of oil-quenching, lies in the purity and the process of fabrication of the steel. In other words, for water-quenching a better product is demanded.

The carbon content will be the same in either case, and it has been stated many times that a cementing steel from the carbon point of view should be so low in carbon that it will not take on perceptible hardness when it is quenched from a high temperature before it is case-hardened. The carbon content to satisfy this condition must be under 20 points, and some metallurgists claim that perceptible hardness will obtain when the carbon content equals 16 points. In some of the best grades of automobile steel, the carbon content to satisfy cementing conditions is limited to 10 points, in which event the steel will serve perfectly, under conditions of water quenching, particularly if it is an acid open-hearth variety, low in sulphur and phosphorus. As a matter of fact, for water-quenching, an acid steel should be used, and the carbon content should be below 16 points.

In garage repair work where it is utterly impossible to consider that the steel will be from special heats, or of a "jewelry" variety, the mistake is sometimes made of selecting fairly good brands of relatively high-carbon steel basic in character, and chemically low in the metalloids. This comes nearer to being a mistake than anything else in the absence of intelligent treatment. It is probably safer to purchase what is known as machinery steel, limiting carbon to less than 10 points, even with the full knowledge of sulphur up to 0.10 and phosphorus keeping it company. The low carbon, to a very considerable extent, masks the metalloids, and after cementation the products work out extremely well for the small parts to which reference is made.

SOME DETAILS IN THE CEMENTING PROCESS

Since in all fairness, it is not possible to grow a depth of carbon by heating the parts to a cherry red, and smearing cyanide of potassium over the surfaces, then re-heating to the previous color and quenching, it becomes desirable to follow some more skillful process, which may be briefly set down as follows:

Pack the parts to be cemented in a cast-iron box, or a length of wrought-iron tubing, utilizing such cement material as ground bone, leather, or other like material, in which a certain amount of the cyanide can be utilized to advantage if the operator will take the pains to definitely compound the material on each occasion, when a batch is being made, in order that he will always be able to judge as to the effectiveness in a given time.

FURNACE USED IN CEMENTING WORK

Fig. 3 shows a cement box C1 on the fire-brick floor F1 over a furnace, as used in the Premier plant, in which the heat is indirect, there being a fire-brick wall protecting the work at all points. The damper R1 regulates the intensity of the heat, and the door S1 is closed. The operator is enabled to observe as to the color due to heat by sliding back the cover of the spy-hole, S1.

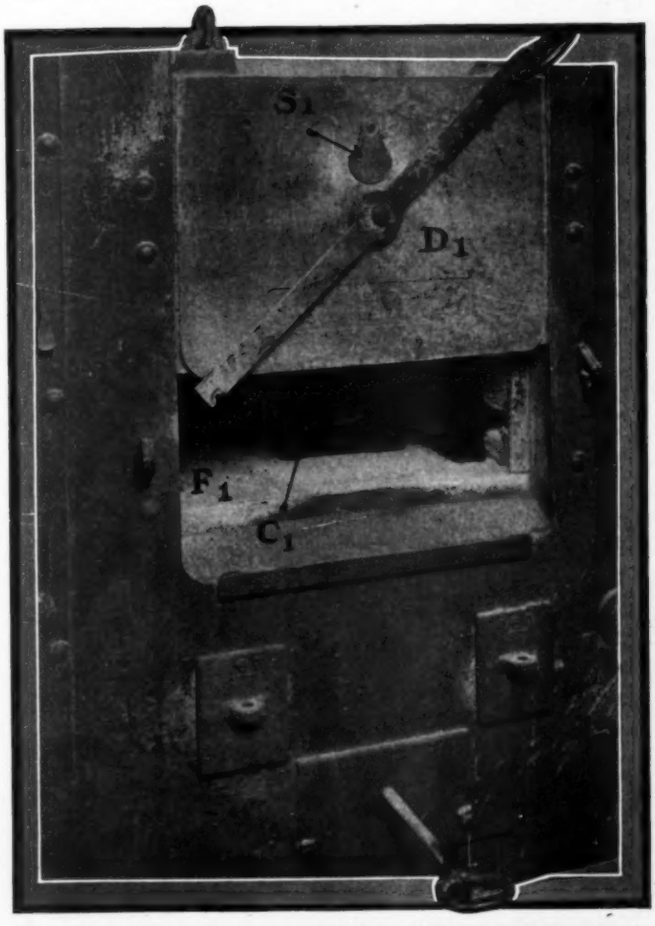


Fig. 3—Furnace in which gears, shafts, and similar parts are heat-treated

ACCIDENTS FOLLOW BLIND DRIVING ON THE ROAD

WINTER is the time when driving is the more difficult due to the presence of slush and snow, the narrowness of the beaten roadway, and lack of tractive ability of the road wheels of the automobile. There are many reasons why Winter driving is only to be indulged in by the autoist who, if accidents are to be avoided, knows how to manage his automobile. In Summer time, when roads are good, it is not unusual to see touring cars of some ability, picking up the road, as the saying goes, with little regard for the distance in which the motion can be arrested, it being true, as will be shown, that it takes a certain distance to stop a car under the most favorable conditions of the roadbed, no matter how good the brakes may be.

This speeding during the Summer's season makes excellent practice towards a first-rate smash-up when snow flies and roads become difficult. The months of practice under favorable conditions make no hint of the hazards which will lie in this same dexterity under the worse conditions to follow. Practice would be advantageous were there any relation between the skill of the driver and the distance in which motion can be arrested, that is to say, the space required in which to stop a given automobile after the brakes are applied.

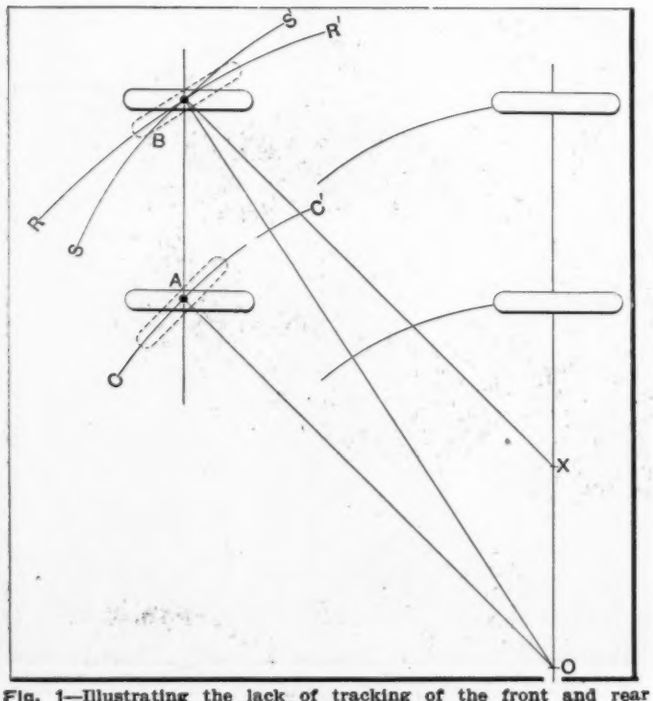


Fig. 1—Illustrating the lack of tracking of the front and rear wheels of an automobile on a curve

STATEMENT OF THE PROBLEM INVOLVING DISTANCE

According to Durand:

Let,

W = weight of the automobile;

F = energy which must be expended in bringing a car to rest, as measured in foot-pounds;

L = distance in feet over which the energy must be expended in the braking effort.

V = velocity in feet per second.

When,

$$\text{Energy} = \frac{W V^2}{2 \times g} = \frac{W V^2}{64.4} = \text{in the abstract.}$$

$$L = \frac{W V^2}{64.4 F}$$

$$F = \frac{W V^2}{64.4 L}$$

Without pursuing this phase of the problem further, granting that the expressions are based on fact, it is possible to make the point in view; the weight of the automobile will be constant,

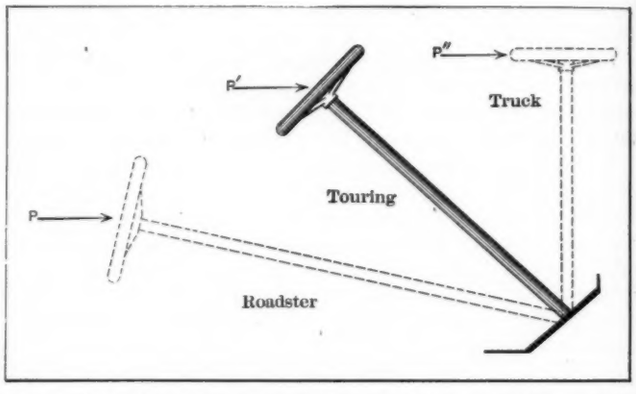


Fig. 2—Indicating different positions of steering wheels, and the increasing tilt with increasing speed

gravity will remain as ever, and the force F, which must be expended, will bring the automobile to rest when the value of the expended force is equal to the energy residing in the moving automobile, and not before.

Thus far there is no limit to the shortening of the time required to bring the car to rest, but it must be remembered that the tractive ability is limited, and, it has been found that traction, if it is exceeded by applying the brakes too hard, causing skidding, eliminates all possibility of stopping the automobile within the shortest possible time.

On a hard, level road it has been found that the tractive coefficient is about 0.60, and, on an iced incline, this coefficient reduces to about 0.10. There are all sorts of intervening possibilities, and it is on this account that autoists who practice up in the Summer time may, without half trying, end up in the Winter's snow-bank, or worse.

According to the accepted coefficient, if each rear wheel of an automobile sustains a weight of, say, 1,000 pounds, then the tractive effort (maximum) must be limited to 600 pounds, for the reason that:

$$0.60 \times 1{,}000 = 600.$$

BRAKES MUST BE IN GOOD WORKING ORDER

To equal 600 pounds on the periphery of a road wheel (at the point of road contact), if the brake-drum is one-third the diameter of the wheel, the pressure on the drum must produce an equivalent of:

$$3 \times 600 = 1{,}800 \text{ pounds.}$$

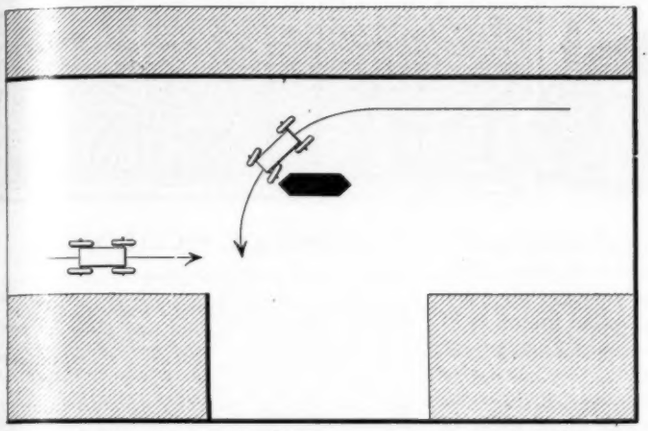


Fig. 3—Showing an approaching and a turning automobile under conditions of great danger

This drag on a brake drum of 12 inches in diameter would be:

$$P = \frac{1{,}800}{f} = \text{pressure applied by brakes.}$$

When

f = coefficient of friction of the brake shoes.

The coefficient depends upon the nature of the material used for facings on the shoes, and may be:

0.33 for cork inserts; 0.25 for asbestos fabric; 0.16 for dry leather; 0.08 for metal to metal.

Granting that the facings are so efficient as to afford 0.25 as the coefficient, the actual pressure will have to be:

$$P = \frac{1{,}800}{0.25} = 7{,}200 \text{ pounds.}$$

REAL DANGER LIES IN TURNING AT HIGH SPEED

Thus far it has been the aim to indicate briefly the possibilities, and it will now be in order to point out that all these limitations fail if the direction is not in a straight line. Just what it means to make turns at high speed is a matter to be treated at some

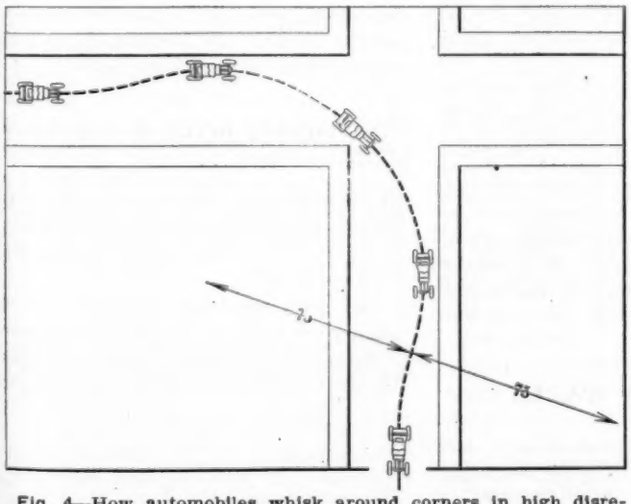


Fig. 4—How automobiles whisk around corners in high disregard of life, limb, and property

length, and, for the better understanding of the dangers, it will be taken up as a separate matter.

In driving, then, make speed on a hard, level road, when the line of vision is not intercepted by foliage, buildings, turns, etc. When it is necessary to turn out, slow down; if crossings are ahead, slow down anyway. Fig. 1 is offered to indicate that front and rear wheels do not "track" and that skidding is likely, even entirely beside the law of centrifugal force, because the rear wheels are very likely to find a bad spot in the road, even if the driver does guide the steering wheels in a good part of the road.

Fig. 2 is offered to illustrate another phase of the problem: If the location of the steering wheel is different from that which obtains in some car to which one may have become accustomed, it is dangerous to jump into the car and "hit it up" before becoming practiced and getting used to the new location. Standardization is one of the crying needs on this very account, and it is much to be hoped that the time will arrive when all automobiles will be exactly alike as to the steering gear and control.

Fig. 3 offers an opportunity to discuss the question of right away, and, with the "island," as shown in the middle of the road, it is easy enough to see that the automobile which is making the turn is in the right position, but this is no indication of the fact that this car should come to rest to enable the approaching car to go by. The driver of an approaching automobile would be justified in the belief that the turning car is going straight ahead, and it is the duty of the driver to see that the way is clear.

Fig. 4 illustrates the way turns are made when the guardians of the peace are out of sight, and, while there is no denying the

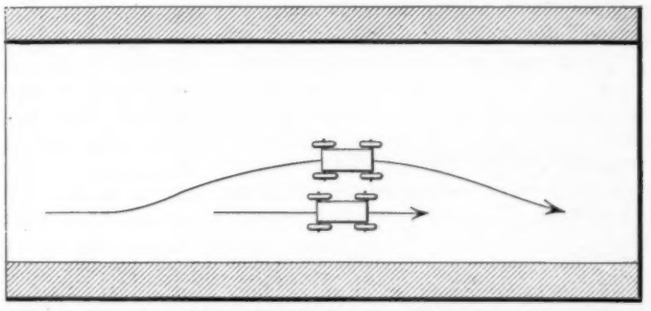


Fig. 5—Proper method of passing an overtaken vehicle, turning out to the left, which is then correct.

contention that it is the right way to do a curve at the highest possible speed without skidding, it is, nevertheless, wrong; the end will be an accident. This may be stated with certainty.

Fig. 6 shows how a turn should be made, but it must be remembered that a lookout must be kept for approaching automobiles, on the ground that the automobile which is about to make the turn has no right before the turn is actually made in safety to the car, other automobiles, and the public at large.

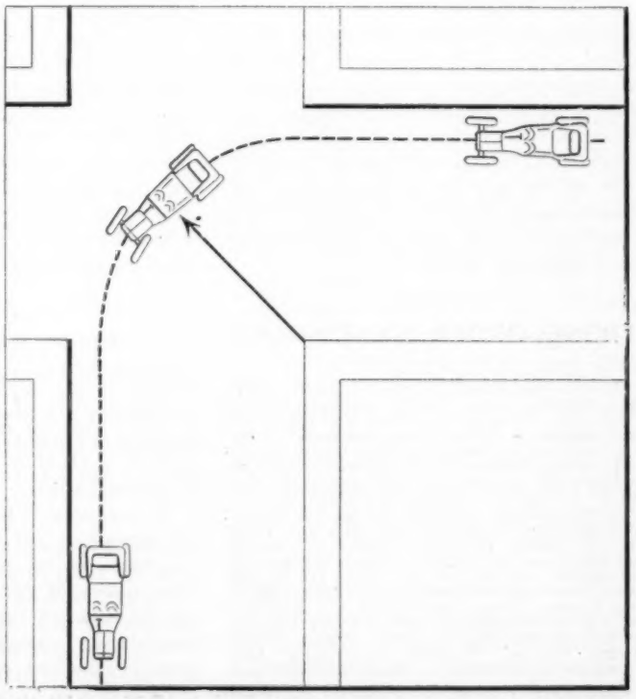


Fig. 6—How automobiles go around corners on a safe basis if the driver remembers his responsibility

GAS VELOCITY FORMULA

Editor THE AUTOMOBILE:

[2,149].—Will you please publish a formula under "Letters Interesting" for the velocity flow of gas through a 2 1-4 in. valve on a four-cylinder, four-cycle automobile engine of 4 1-2 in. bore by 5 in. stroke, 1,250 ft. piston travel, 78 pounds compression?
Racine, Wis. J. F. SLADKY.

The velocity flow depends upon the sizes of the pipes, as smaller pipes require a faster flow to supply the same amount of gas, while larger pipes would permit of a slower rate of flow. The size is usually formulated from the speed of gas flow. For exhaust gases 10,000 ft. per minute, and for inlet gas speed 6,000 ft. per minute are usual practice.

For the cylinders mentioned, the capacity is 79.52 cu. in. per cylinder every two revolutions. With the given piston speed and length of stroke, the rotary speed is 1,500 r. p. m. So the motor demands are

$$\frac{1,500}{2} \times 79.52, \text{ or } 59,610 \text{ cu. in. per min.}$$

This is equivalent to 34.5 cu. ft. per minute. Since the gas speed is known and the motor demands, also, dividing one by the other gives the area of the pipe which will allow that amount of gas to pass at that speed. Thus:

$$\frac{35.5}{6,000} = .00591 \text{ cu ft.} = 10.21 \text{ cu. in.}$$

Now, as the pipes are round, this area may be looked up in any table of area of circles, from which it is found that the diameter would be 3 5-8 in. Increasing the gas speed to 8,000 ft. decreases the diameter to 3 in., while a still further increase in speed to 10,000 ft. results in a pipe size of 2 1-2 in.

Put into formula form, this becomes:

$$\frac{ARL}{6,000 \times 12 \times 2} = \text{size of pipe.}$$

In which A is the area of the piston in square inches, L the stroke in inches, R the revolutions per minute, and the denominator is the allowable speed in feet per minute reduced to inches, while the factor 2 reduces the revolutions to one-half, on account of the gas being drawn in or exhausted but every other revolution. If the results do not suit, alter the first figure of the denominator to suit.

FIRING ORDER 8-CYLINDERS

Editor THE AUTOMOBILE:

[2,150].—Referring to the enclosed sheet, upon which I have given a number of firing orders, are these correct, and are there any more ways to fire an eight-cylinder, four-cyle, vertical engine with four-throw crankshaft, two cylinders to each throw, cranks set in pairs 180 deg. apart, pair groups 90 deg. apart? To make it clearer, I will say that the first and second cylinders are on one throw, third and fourth on another, each pair being 180 deg. apart; fifth and sixth and seventh and eighth are arranged in the same way 180 deg. apart, but the last two pairs are 90 deg. apart from the first two. Cylinders to fire 90 deg. apart. These are all of the different ways I could think of, and if there are any more I would like to have them. Please answer through "Letters Interesting, Answered and Discussed." A SUBSCRIBER.

On the enclosed sheet spoken of above are given all of the possible combinations of the eight numbers, 128 in all, some of them, in fact, being just the inversion of those previously given; that is, a number are given twice, the second being but an inversion of the first. The table is not reproduced for lack of space. Eliminating these, and also those in which the order as a whole is the same, but simply starts with a different number, the number of firing orders will be less—much less.

If the first and second cylinders are in the same pair, that is, in the same casting, while the third and fourth are also side by side and in the same casting, there must be an interval of 270 deg. after each 90-deg. interval. If, on the other hand, the first cylinder is in the same casting with number three, and number two with four, one and two being upon the same crankpin as described, while three and four are upon the next pin together, then, and then only, will it be possible to fire the cylinders so that there will be an exact and constantly recurring 90-deg. interval.

On page 117 of his work on "Balancing of Engines," Archibald Sharp discusses this subject in a very thorough manner.

COST OF COMFORT

Editor THE AUTOMOBILE:

[2,151].—Please give me some information as to tires without air—that is, solid tires, which have some sort of an interior air compartment, but which are not pumped up by means of air. READER.
Coldwater, O.

In the use of a tire of this sort, the majority of people taking them up are not only willing but glad to exchange the freedom from puncture for almost anything. With proper springing and semi-solid tires having a central, non-pumped-up air cushion, the riding qualities are all that can be desired, while the construction is such as to allow the driver to absolutely forget that such a thing as a puncture, air leak, etc., actually exists.

MAKERS OF AXLES

Editor THE AUTOMOBILE:

[2,152].—Will you please give me a little information? I have a rear axle, of which I would like the maker's name. The only mark on it is "H-D" or "O-D"; the stamp is not very plain, so I can not tell exactly which. The gear box is spherical in form.
Reading, Mich. C. A. BROWN.

We are unable to give you the name of the makers of this axle, as the mark (either of them) is one we have never heard of. The makers of this axle are invited to send in the name of their company, or, if preferred, may communicate direct with this party. Any one recognizing the make of axle is invited to help this party out of the dilemma.

FOND OF NICE BODIES

Editor THE AUTOMOBILE:

[2,153].—I beg to differ from you on the question of the automobile body as discussed in an editorial in THE AUTOMOBILE some time in December. The automobile is so unlike a carriage; you can have a magnificently finished carriage body and keep it fine; because of the large wheels and narrow tires it does not get all splashed up with mud and become spotted. It can be kept showy and for display. Not so with the automobile body; its speed, its small wheels with broad tires, which splash mud all over the body, likewise dust. It is more like a battleship in action, and hence the body should naturally, logically, and common-sense-like differ from the luxurious carriage body. The torpedo body refined is the body, and should be the new aluminum metal painted battleship, gray and not varnished. Nor should it be luxuriously rubbed down and recoated 18 or more times, just like a piece of parlor furniture. It soon gets all spotted up, and looks no better than a good job of painting. Then, if it were so made, it can be easily washed and wiped off, and, if marred, touched up and kept looking nice, yet have the look of utility, comfort and commonsense to it. The manufacturer who educates his clients to good practice along these lines, that the automobile is to use and not display, will win out by and by. W. P. LUCAS.
Oil City, Pa.

Little comment on the above seems necessary, except to say that instead of being a thing of the future, the body described is very much a thing of to-day, both of the Shows, just closed, showing a number of this kind. However, there will always be a very large class of people demanding and willing to pay for the highly finished body. This, too, in spite of the facts, so well brought out above, that the more highly finished the body, the greater the amount of work connected with keeping it in a condition commensurate with its finish.

ON HORSEPOWER RATINOS

Editor THE AUTOMOBILE:

[2,154].—Have you a chart or table for distribution showing rated horsepower of cylinders of various sizes? If you have not such a table, but the information has been given in your magazine, will you mention the date of issue? W. G. DUFFIELD.
Ottumwa, Ia.

The great majority of makers in this country use the A. L. A. M. formula, which is the bore of the cylinder squared times the number of cylinders, divided by two and a half. That is:

$$\text{Power} = \frac{2.5}{D^2 \times No.}$$

From this any sized engine will readily be computed, or by referring to the issue of THE AUTOMOBILE for January 14, 1909, page 100, you will find all of the common sizes, both in inches and millimeters, computed and listed in tabular form. In addition, you may obtain the same information from the handbook of the A. L. A. M., which is distributed gratuitously from the office at 7 West Forty-second street, New York City.

DIRECT FUEL INJECTION

Editor THE AUTOMOBILE:

[2,155].—Will you kindly answer the following questions through your column, "Letters Interesting, Answered and Discussed"? 1. I am designing a motor in which the fuel is to be injected by means of a pump. The area of my cylinder is approximately 37.77 cu. in. and the clearance space 11.25 cu. in., giving a total area of 49.02 cu. in. What should be the diameter and stroke of my injecting plunger and the size and shape of the nozzle through which delivery is made into the cylinder? The design is such that at the time of fuel injection there can be nothing present in either cylinder or compression space save pure air.

2. In order to obtain crankcase compression of 7 pounds per sq. in., what should be the crankcase volume as compared to the combined volume of cylinder and compression space?

3. Assuming free air at 60 deg., what will be the temperature if compressed to 7 pounds pressure; also, what will be the drop in temperature due to instantaneous expansion of a given volume of air at this pressure, provided no moisture is present?

4. Is there any objection to the use of a steel casting for a motor cylinder where air cooling is contemplated, and, if not, what general reduction could be made in thickness of cylinder walls, as compared to cast iron?

5. If using inserted valve seats, what material would you recommend as capable of standing up best under high temperatures, also what would be the best material for valves? LINCOLN A. LANG.

Castile, Wyo. Co., N. Y.

1. If the pump is so geared up as to deliver to each one of the cylinders in rotation, so that the size of the pump will be such as to equal the capacity of one cylinder per stroke, the bore and stroke should be so determined as to yield a weight of gasoline equal when vaporized to one-fifteenth of the total volume which you have given as 49.02 cu. in. That is, considering 15 to 1 as the proportion of air by weight, the pump should deliver its one-fifteenth. Delivery to the cylinders would best be made through an expanded nozzle to spread the spray around.

2. Compression follows approximately the law expressed as a formula in the form

$$\left(\frac{V_1}{V_2}\right)^{1.35} = \frac{P_2}{P_1}$$

in which V_1 is the original volume, P_1 the original pressure, V_2 the final volume, and P_2 the final pressure.

Taking 14 pounds per square inch as the original pressure and 14.7 pounds + 7 = 21.7 as the final pressure, the volume is easily obtained by substitution, as:

$$\left(\frac{21.7}{14}\right)^{1.35} = \frac{49.01}{P_1}$$

Working this through, the answer is 88.8 cu. in. volume of crankcase to give 7 lbs. pressure, gage.

3. By substituting for V_1 T_2, and for V_2 T_1 in the above equation, the temperatures may be figured. The instantaneous drop cannot be figured in any simple manner.

4. Steel has been used for cylinder castings, and more particularly, for pistons. The principal objections to its use, if there can be said to be any, is the difficulty of casting it sufficiently thin for such parts as water jackets. If the cylinder in question was intended to have overhead valves and be air-cooled, there should be no trouble. The reduction in size or thickness should be made in the ratio of the strengths of the two metals. In this connection, Unwin gives cast iron an average tensile strength of 17,500 lbs. and cast steel 63,000 lbs. These figures would give a ratio of 1 to 3.6, or, say, 1 to 3. On this assumption it would be possible to make the steel cylinder walls one-third of the thickness which would be used for cast iron. However, do not take these figures as correct, and do not go below one-half of the usual thickness for iron.

5. Cast iron is considered very satisfactory for valve seats, while carbon-steel stems welded to a nickel-steel head makes an excellent valve.

CRYSTALLIZATION DANGER

Editor THE AUTOMOBILE:

[2,156].—At some cost of space, kindly permit me to recite a condition which confronts many autobomilists and for which they know of no remedy, but which you may. I am still driving a 1907 car. It is a good one, stands up well, and answers my needs in every way. I am therefore reluctant to part with it, because of its present excellent service and for the further reason that the purchaser would be exposed to a hazard which I now feel is far from inconsiderable. I refer to crystallization. The car has gone all of 10,000 miles, possibly 15,000, and I never get in it without the applehension that the axles or steering knuckles or rods or some part of the chassis may be crystallized through vibration and be no more than so much punk. It may go to pieces and run me and mine into oblivion "without benefit of clergy" or other alleviatory circumstances. What thousands of owners wish to know is some method of detecting crystallization. There ought to be some process. Will you enlighten up, and thus enable many to add a needed sense of security to the joys of motoring?

HERVEY C. LIPPINCOTT.

Philadelphia.

Danger from this source is much exaggerated. If this were not so, would anyone be safe in riding in railroad trains, trolley cars, or other vehicles of a similar nature, in which a metal axle is used?

As for detecting such a remote possibility as partly crystallized axle or other piece of metal, there is no instrument known which will do this.

The crystallization of metals under repeated stress is an action which is not fully understood even to-day, some chemical engineers claiming that the allotropic changes in the constituents of the steel work out in a larger percentage of the softer alloys, in which manner the metal, as a whole, is weakened.

CORRECT PISTON CLEARANCE

Editor THE AUTOMOBILE:

[2,157].—Will you answer the following question? I have my car down and want to get it ready for another season. It has a high speed engine and not very much compression. My new set of piston rings help some in that line, but the wear soon tells. The pistons are about nine one-thousandths (.009") small, the diameter of the cylinder 3 3-4 in. If I put in new pistons and allow about four one-thousandths (.004") clearance, will I get any bad effect, or will I have what the engine needs and should have had long ago? E. R. DAVIS.

Rockland, Me.

While the figures given differ from current practice, if the proper rings were used, the size of the piston should have no bearing upon the speed or compression. Usual practice in this respect is three-one-thousandths (.003) at the bottom and five-one-thousandths (.005) at the top, where the heat is greater, and consequently the expansion also. It is upon the rings that you depend for gas-tightness, and if you are not getting it, get new and stiffer rings. The change suggested might be tried, but stiffer rings would be better.

LEFT-HAND DRIVING

Editor THE AUTOMOBILE:

[2,158].—Will you state through "Letters" the so-called advantages of having the steering wheel and driver located on the left hand side of the car. C. M. LINGLE.

Graceton, Ind. Co., Pa.

Chief among the many advantages of left-hand driving is the fact that the driver is closest to all vehicles which he meets, and can thus avoid them most easily. Another reason is that a front seat passenger may be discharged at the curb without crawling over the driver or steering wheel. The weight of the driver balances the torque of the motor, and also, the inclination of the car due to the camber of the road.

GEAR-GRINDING NOISES

Editor THE AUTOMOBILE:

[2,159].—I have a Chalmers-Detroit type F car, made in 1909, which has always had the disagreeable grating rattle at critical speeds, the same as your correspondent of the December 9, 1909, issue. The manufacturers advance the theory that this is due to a vibration of the gears in the change speed transmission, and have agreed to replace these gears with others of a much tighter fit. Do you consider this change as one that would decrease the noise.

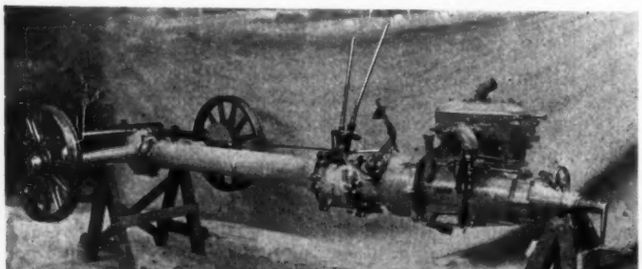
W. IRVING KIMBALL.

Philadelphia.

This change would very likely eliminate the noise entirely, else the makers would not have suggested it to you, since it is to their interest to have the car run as quietly as is possible. More than this they would hardly furnish you a new set of gears and a shaft free of charge, unless they were sure that it would help out in your present dilemma. In a letter from this firm, relating to the other correspondent to whom reference is made, the idea is advanced that much noise comes from an improper adjustment of the driving bevel gears in the rear axle. This is a matter which requires considerable experience in order to be sure that the gears are really meshing on their pitch lines.

A NEW FRENCH LIGHT CAR WITHOUT A CHASSIS

CARRYING along the tendency toward unit construction, of late an increased number of automobiles have been noted on which the whole effective mechanism is grouped in two parts. This construction takes two forms; in one the engine, clutch and transmission form the front unit, while the rear axle constitutes the rear or second unit. In the other, the engine and clutch form



Simplicia Chassis-Less Car as It Appears from Front

the front unit, while the gear box is an integral part of the rear axle a la Packard, this forming the second or rear unit.

In a recent French invention this process of combination and simplification is carried one step further, in that the engine, clutch, transmission, rear axle, torque tube and all operating levers are united into a single piece or unit. To the forward end of this the front cross-spring may be pivotally attached, the whole then constituting an automobile minus a body. This constitutes, then, the frameless car, or, as the French call it, the car *sans chassis*.

While the car has many advantages and disadvantages as compared with the ordinary car built up with a frame, it will be advisable to look into the construction first. With this idea in view, two pictures of the complete unit, as well as a constructional drawing, are herewith presented.

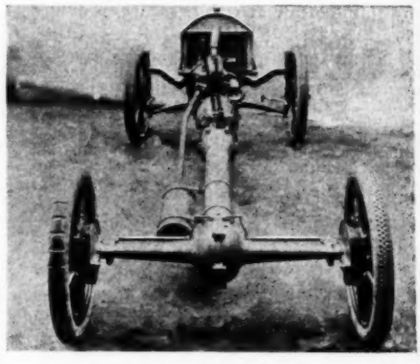
The engine is of the four-cylinder type, cast *en bloc*, the sizes being 75 mm. (2.95, almost 3 in.) bore by 100 mm. stroke, the English equivalent of the latter being 3 15-16 in. Roughly, then, the engine is 3 by 4, which would give a power rating of 14 horsepower. The makers, l'Aster, however, rate the engine unit at but 10-12 horsepower.

To the rear end of the crankcase, which is of the barrel type, with circular plates closing the ends and forming the end bearings, the clutch casing is bolted up, much on the style of the Chalmers-Detroit 30. The flywheel is of small diameter, as the design would seem to require, but this deficiency is made up by its length. At the rear end of the flywheel is carried the double cone clutch, close-coupled to the gear box, which furnishes three speeds and reverse, operating selectively.

To coact with the gear changing and facilitate the same, a shaft brake is furnished, which consists of an expanding band working in oil. To the rear end of the transmission case is fixed the torque tube, which in this case also acts as the connecting frame of the front and rear parts. This tube is apparently about 6 in. in diameter, with metal walls of a thickness between 5-16 and 3-8 in. It terminates at the rear end in a housing for the bevel gears and usual rear axle construction. The rear axle is of the full floating type, with the axles driving the wheels at the outer ends through the medium of jaw clutches.

Barring the engine, all rotating parts are mounted upon ball bearings. Motor cooling is by thermo-siphon, and the lubrication is force feed, with a gear-driven oil pump. In addition to the shaft spinning brake previously mentioned, a set of internal-expanding rear-wheel brakes are provided, these being operated through rods and levers mounted upon and carried by the large diameter main tube.

In the construction shown the tread is 53 1-2 in., and the wheelbase 98 3-4 in., but for larger car bodies—this one is for a taxicab—the tread may be increased as well as the wheelbase. Of course, with a longer wheelbase, as 101 1-4 in. for a double phaeton body, the tube becomes longer, all of the other parts remaining the same. Neither the construction nor the literature sent out by the makers, Lacoste & Battman, 15 Rue Danton, Levallois-Perret (Seine), France, show any change of diameter or thickness of metal for this elongation.

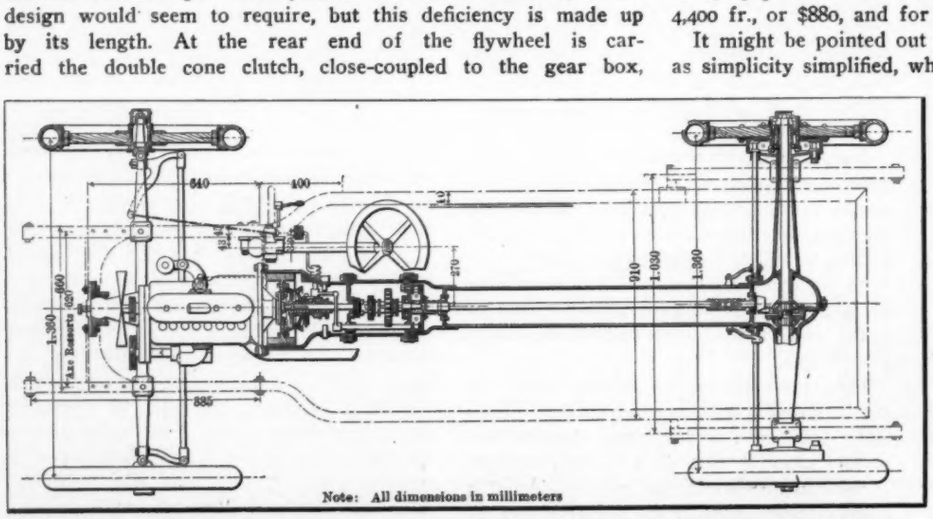


Simplicia Construction from Rear

Complete as shown, but without the front axle or steering gear, which appears to go with the axle as another unit, the weight is 400 kg., while the outfit with these items added, as well as the very necessary radiator, but without tires, weighs 550 kg. The former is equivalent to 882 pounds and the latter to 1,213 pounds. In the former condition the selling price is 4,400 fr., or $880, and for the latter 5,200 fr., or $1,040.

It might be pointed out that while this appears at first glance as simplicity simplified, when all things are considered, it is not. Thus, no provision is made for springs, radiator and water connections, lubricator telltale, ignition connection, steering gear, spark and throttle levers, gasoline tank and connections, etc. These would have to be added in part to the unit shown, while others would have to be carried by the body. Similarly, the whole rear weight appears to be unsprung, which, to put it mildly, would be hard on the wearing qualities of the parts.

More than this, the tube forming the main strength of the combination appears very light. Not every one likes the operating levers at the left, as this design locates them, with the driver at the right-hand side.



Working Drawing of Simplicia Construction, Showing Clutch, Transmission and Main Tube

NEW PEERLESS FRICTION SHOCK ABSORBER

IMPORTANT describes the position which is occupied by shock absorbers on automobiles. This was never better understood than it is at the present time, it now being realized that the life of the working components of an automobile is absolutely dependent upon:

(a) The dynamic characteristics of the material used.

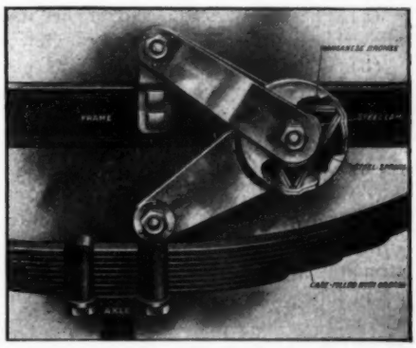
(b) The dampening of shock.

It makes no difference how good the material may be, its dynamic life is limited nevertheless, the only difference being that life will be longer if the material is better in a kinetic sense. Insurance statistics seem to prove more or less consistently that the life of a car increases enormously with its ability to travel fast, and high quality of material and construction does not apparently add sufficient to the life to satisfy the extra expenditure made to produce this quality.

It will be a matter of years, perhaps, before the law of the automobile as a road performer will be sufficiently understood to enable engineers to determine with absolute certainty as to the best way to definitely prolong life. As it is, even though engineers are working in the dark, to some extent, the fact remains that any method by which easy riding qualities may be induced into automobiles is the very one that is at the bottom of shock defeating conditions. Designers seem to be well along on the right road.

The extent to which all these conditions obtain depends upon the spring suspension of the automobile in so far as springs are capable and upon shock absorbers for the rest. The shock absorber situation has taken on an extremely important bearing in view of results obtained, but the accessories of this character, when they first put in an appearance, were scarcely equal to the character of the work which they were required to do. Improvement has been rapid, consistent, and it is now fairly understood that the shock absorber situation mechanically is on a sufficiently high plane to debar it from discussion in the haunts of incapacity.

The new Peerless shock absorber as here illustrated is so clearly presented that discussion would scarcely seem to add value unless to point out that the steel cam works against flat springs, placed in a triangular relation within the housing, and since the cam contour may be fashioned for any desired relation of resistance to action, it is possible to realize the most agreeable riding qualities, dampen the vertical bounce in the proportion which will eliminate shock, and adjustment of any kind becomes practically unnecessary, since all the faces are glass-hard and stability is the prime characteristic. This shock absorber is manufactured by the J. H. Sager Company, Rochester, N. Y.



New Peerless Shock Absorber

BALL AND SOCKET JOINTS WIDELY ADAPTED

THIS year there is a considerable migration in the direction of some of the earlier practices as they obtained in electric vehicle building a few years ago. Old-timers will remember that ball and socket joints were much used in some of the earlier vehicles, and it now seems that the fine qualities residing in this class of work are being missed. The illustration here offered is of the latest Pierce-Arrow practice, and, if cars of this make are examined, it will be found that there is a considerable addition of this type of joint, taking the place of "yoke" joints in several places. Last year the ball joint was limited to steering drag and cross rods, but now it is not uncommon to find that the ball joint is substituted. What is true of the cars already named is equally to be observed in Peerless, Packard and numerous of the other makes as well.

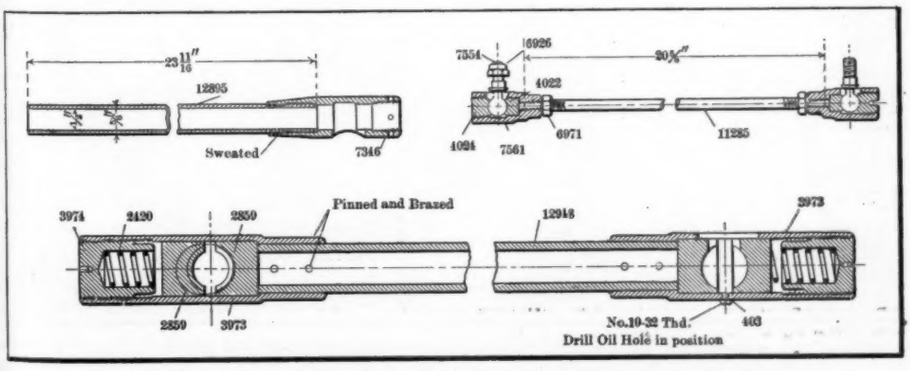
It is not always necessary to have the universal principle present in these links and levers, and in some of the cars this year a mixed system is employed. The ball and socket joint in these cases is limited to the members which have to be universal, and the yoke idea obtains for the balance. Fortunately when the universal joints are of good design the work imposed upon the remaining joints is very much reduced, and the final result is by way of a substantial improvement. That this reversion to an old idea is along permanent lines is more nearly true now that the methods of manufacturing ball and socket joints are so much refined as to eliminate the main reason for having abandoned them, some two or three years ago on the score of first cost, they are now cheaply made.

The advantages derived from the use of ball and socket joints are too well understood to require explaining, but the fact is sometimes lost sight of that a spherical bearing presents considerably more surface than that which will be available with a bolted yoke system. As an illustration of this point it is only necessary to make a single comparison:

(a) Pin bearing 1-2 x 1-2 inch affords 0.25 square inch of projected area provided the fit is within close limits of tolerance, which is not always true.

(b) Spherical bearing 1-2 inch in diameter, gives 0.7850 square inch, one-half of which would be 0.3925 square inch.

The advantage of adjustment is much in favor of spherical bearings in work of this character, and this is worth more, perhaps, than any other one point. The parts illustrated show evidences of much refinement, and it now looks as if the small parts around the carbureter and ignition systems of automobile motors will have parts of this character in the future to a considerable extent, they being preferred on account of quality.



Details of Component Parts of Pierce-Arrow Ball and Socket Joint

CONTROL SYSTEMS INVOLVING THE CARBURETER

DRIVERS, especially in trucking and delivery service, due to the high gear ratio of the "direct on high gear" system, usually the bevel drive, find it a little difficult to manipulate the control system in such a way as not to damage the motor when the desire is to slow down or stop. De-clutching is the first operation, but if, in performing this operation, the spark is not retarded, and the mixture throttled, the motor will "race."

The extent to which a motor will speed up (race) when the load is suddenly relieved as in de-clutching, depends upon the characteristic of the motor. To induce this undesirable racing, a motor should be designed as follows:

(a) The compression should be maximum possible within allowable limits from the point of view of pre-ignition.

(b) Valves should be as large as possible; half the bore of the cylinder being a good figure.

(c) Timing of the valves should be excellent; over-lapping and nice relations of inlet and exhaust valves with respect to the travel of the pistons would add.

(d) The valve motion should be as free from inertia as possible, in order to realize prompt closing.

(e) Springs, placed to close valves, should be of the right strength and alive.

(f) The carbureter should be with a sufficiently large opening, and wide enough in its range of good mixture to respond to sudden speed changes.

(g) The intake manifold should be relatively large in area; the suction depression should be limited.

(h) Exhaust manifold openings should be of large area, straight, and well balanced from the gas transfer point of view.

(i) Back pressure, due to inferior mufflers, should be avoided.

(j) Ignition should be thoroughly capable from the energy point of view, and well timed.

When all of the above conditions are properly cared for, the motor will accelerate at a terrific rate if load is suddenly relieved.

PUMPING LOSSES SHOULD NOT BE TAKEN ADVANTAGE OF

In an internal combustion motor of the types used in automobile work, the pumping losses, so called, are largely due to the very fact that the motor must pump the mixture into the cylinders, and pump the exhaust products out at the proper time, hence pumping losses. There are no pumping losses in a steam engine because the steam is generated under pressure and flows in inaided by suction of the engine; the exhaust flows out under pressure, and "clearance" is reduced to a minimum. In automobile motors the clearance is relatively very great—20 to 30 per cent.

If, in attempting to solve the control problem, pumping losses are taken advantage of, it is obvious that the ability of the power plant will be diminished accordingly, and it will then be right to state that, to prevent a motor from racing when the load is removed, it is necessary to fine it, so to speak, during all the time when it is doing its duty.

DISCUSSION OF THIS PROBLEM IS WHAT IS WANTED

If, in the near future, this matter could be "aired," it is more than likely that the accumulation of information which is bound to come from intelligent discussion, will result in much good to the industry. There are a great variety of conditions to be considered in a discussion of this sort, and, in all probability, some of the discussion would have to be revamped for special applications.

Fig. 1 shows how one truck builder went at it, preferring to employ a governor to control the speed of the motor when the clutch is removed, to obviate fusing the motor during its normal working periods, rather than have it run inefficiently on the one hand, or depreciate very rapidly, as it would, were no provision made to prevent excessive speeding. Inertia increases enormously with speed, as was shown in a discussion in THE AUTOMOBILE of December 23, page 1,096—Fig. 13.

The governor, Fig. 1, in this article, is of the horizontal flyball type, with a spring reaction, and it is connected to the auxiliary air valve of the Schebler carbureter in such a way that, when the motor is relieved of its load the governor throttles the mixture—at all other times the mixture is adjusted by the action of the governor for best results.

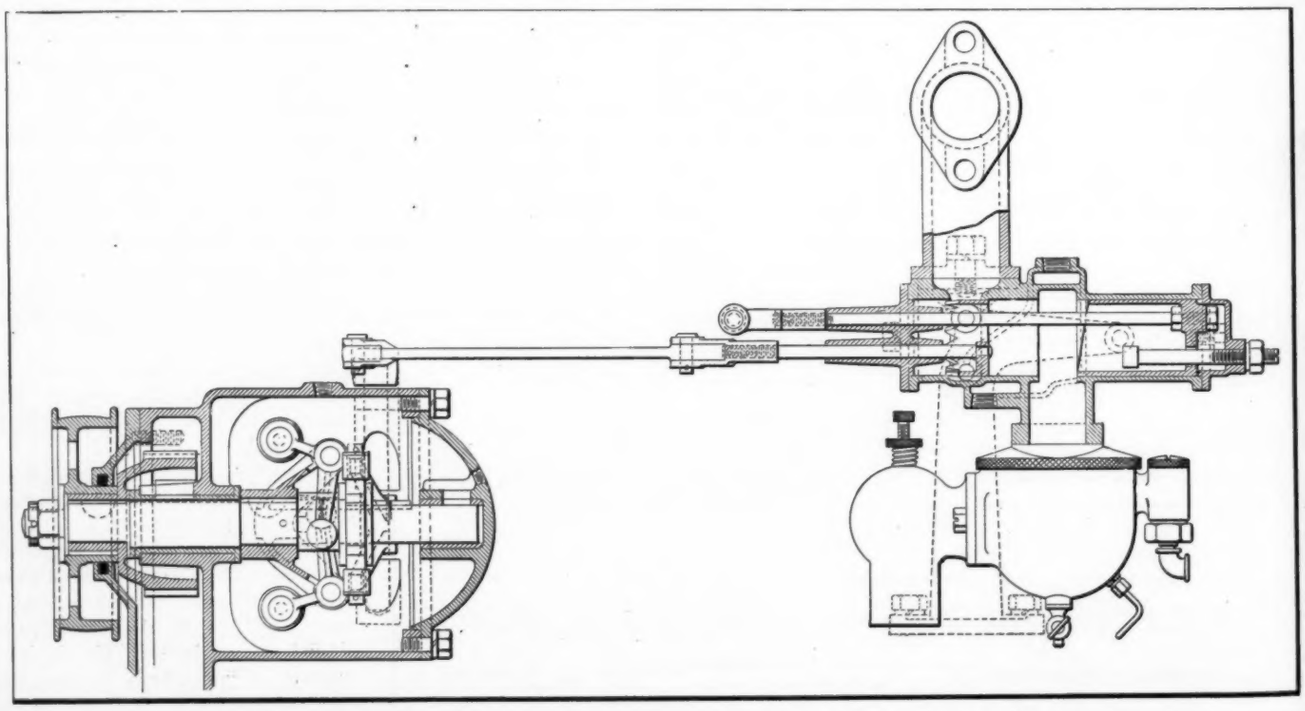


Fig. 1—Automatic control of carbureter, by means of a governor, as used on power plant of Alden-Sampson trucks

HOMOGENEOUSNESS OF MIXTURES ADVANTAGEOUS

Fig. 1—Ball bearing mounting of the shaft of Homo gasoline economizing device

AMONG the particularly interesting devices which came to public notice during the show period in New York this year, the Homo attracted a great deal of favorable comment, and in view of the importance which it occupies in the power plant part of automobiles, its priciples should be discussed.

This device is placed between the carbureter and the intake side of the motor, preferably close to the carbureter in the system, and it has for its purpose the function of splitting up the globule characteristics of the stream of gasoline which is entrained in the inrushing column of atmospheric air. The reason for desiring to destroy the globule formation of the atomized gasoline will be found if account is taken of several conditions, as follows:

(A) Liquid gasoline must be reduced to gas form, hence changed in its state of aggregation, requiring the exchange of heat in sufficient presence, before a mixture of an explosive character can be formed in the combustion chamber of the motor.

(B) The ability of the liquid in its atomized state to take up heat in a given time depends upon the surfaces of the sphere-like globules which form the atomized spray. The law of the surface of spheres must here be taken into account, in which the surface for mass is not in proportion.

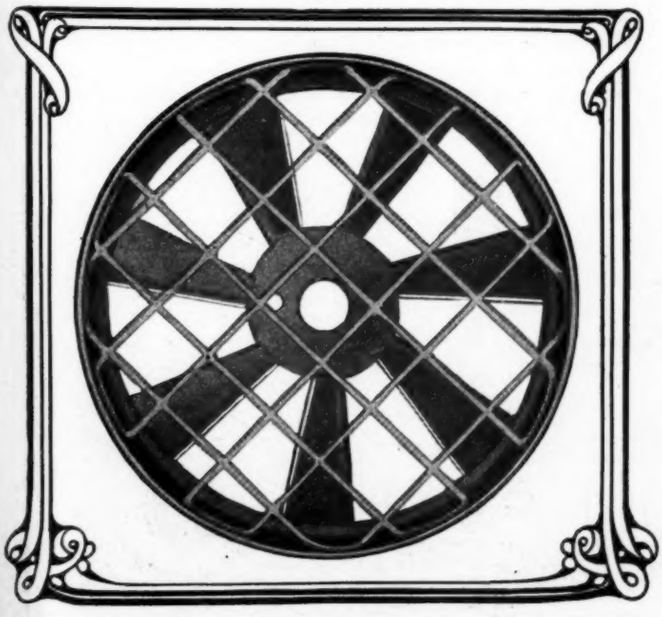


Fig. 2—Fan, which forms principal part of Homo device, and netting covering same

(C) Liquid gasoline if it is permitted to enter the combustion chamber of the motor will be broken down so rapidly after ignition that carbon will coke out.

(D) The exchange of heat which is necessary to form a gas out of a liquid depends upon the latent heat of evaporation of the liquid, and in gasoline like in other liquids, this latent heat has a definite value.

(E) The time factor depends upon (in addition to other factors) the difference in temperature between the liquid and the surrounding as well as upon the ratio of surface to mass.

There are divers other thermo-dynamic variations which will have to be reckoned with under the conditions obtaining, but the device which has been put upon the market under the trade name "Homo" by the Gasoline Motor Efficiency Company, of Jersey City, N. J., is contrived for the purpose of harmonizing the thermo-dynamic relations.

The device comprises a housing with an inlet and outlet orifice

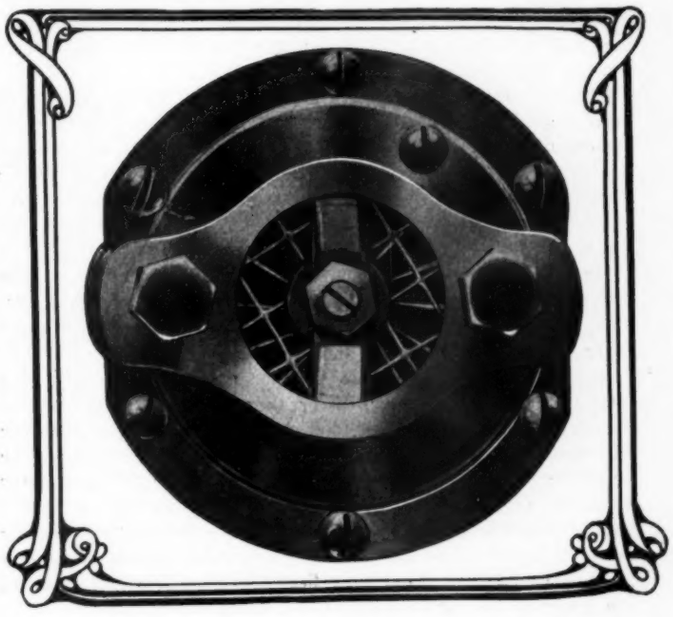


Fig. 3—General appearance of Homo mixer when assembled and ready to go in place

suitably flanged for ready insertion in the intake system, as shown in Fig. 1. The inlet orifice discloses a rather coarse wire mesh which will best be understood by examining Fig. 2. This wire mesh is fastened to the peripheral rim of a fan of the disc type.

THE FAN IS ROTATED IN THE INRUSHING STREAM

The wire mesh which is attached to the fan rotates at the same speed and the stream of air with its entrained gasoline is intercepted by the wires of the mesh with the result that each globule of gasoline is shattered. This splitting up of the gasoline by mechanical contact takes on all the characteristics of a collision, the smaller particles of gasoline are in a much more receptive condition from the point of view of heat absorption because the surface for mass is greater.

The wire mesh performs an additional function in that it provides a series of paths through which heat is transferred from the region of higher temperature around the periphery and this heat is delivered to the relatively frigid particles of gasoline as they are broken up in the mechanical process. The instrument then performs in a more or less precise way the very functions which are necessary in order to produce a homogeneous mixture. The very process which promotes the change of the gasoline to its vapor state and mechanically mixes that vapor with the atmospheric air is that which aborts carbon precipitations.

IMPROVED TYPE HERZ HIGH-TENSION MAGNETO

IMPROVED just describes the 1910 line of magnetos of Herz & Co., New York City. This pioneer firm in ignition and electrical specialties has made several very important changes in the magnetos, but none of these is such as to be termed radical. That is to say, the magneto proper is the same old magneto but with 1910 improvements.

The whole line has been numbered along a systematic and regular method, which of itself identifies any one member of the series. Thus, the magnetos bear a symbol like this, 5 M 4. This means that it has five magnets, and is for igniting a four-cylinder engine.

All told, the line runs from 5 M 1 to 5 M 4 and 7 M 4. Then the larger sizes are from 5 M 6 to 7 M 6. This translated means that there are five-magnet machines for one, two, three and four cylinders, a seven-magnet machine for four cylinders, also five, six and seven-magnet machines for six-cylinders, making a total of eight different magnetos.

These magnetos have much larger magnet, the armature has been improved with a different winding, thus making the instrument stronger and increasing its efficiency. On the contact breaker the platinum points are larger in diameter and heavier than on the others, and the carbon brush on the contact breaker is enclosed in a shell, while on last year's magnetos the same was pressed down with a flat spring.

On the four and six-cylinder type magnetos the secondary distributor carbon brushes are revolving against the plain surface, whereas the former types had the wipe principle on the inner circumference of the insulation.

In the line cut below, showing the construction of the 5 M 4 magneto, as well as the contact breaker and the driving end, the details may be remarked. Thus, it will be observed that the ball bearing has been adopted for exclusive use. Thus, the armature shaft runs on two ball bearings, while the distributor shaft is carried on two at the front end. In this same cut will be seen the unusual accessibility of the contact breaker, the cover of which is spring held in place. The spring is pivoted and a touch of the finger is sufficient to turn it aside, allowing the cover to be removed.

At the right, the view of the driving end shows the contact ring and the high-tension carbon brush binding post as well as the connection from there to the rear end of the high-tension distributor shaft. At the left, the details of the contact breaker are in evidence, among these being the increased size of platinum points, the large diameter of the same being plainly seen.

In this same view, the secondary distributor is shown in dotted lines above. The dotted lines also show the wiring to the various contacts from the binding posts. The ball-ended lever at the left is the spark advance lever, and is attached to the segments, which are rotated bodily to advance or retard the spark. In this same view, the component parts of the contact breaker are to be seen, with the much enlarged platinum tips.

The above are the principal points of improvement, although the entire magneto has undergone a general improvement on the minor parts. All parts are interchangeable and the magneto does not require any lubrication; the bearings are sufficiently lubricated to run for a year. Bearings and all other parts are dust-proof covered.

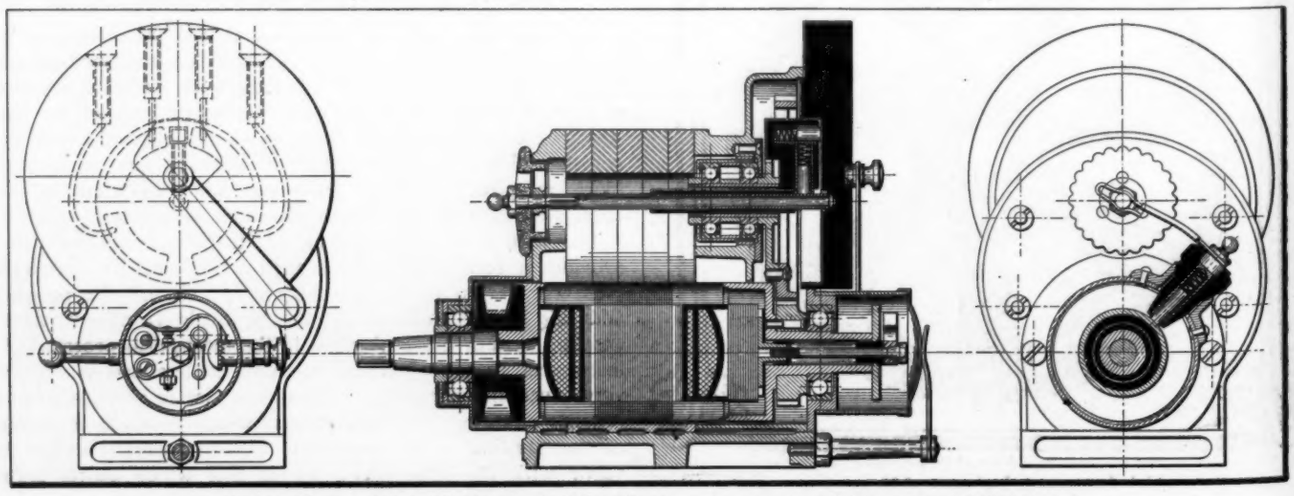
Finally, improvements have not only been made on the larger type magnetos, but also on all smaller types, whereon a much stronger magnet and better armature have been obtained, especially on the two-cylinder 45 degree V-shaped magnetos, on which the armature has been improved by reconstructing the same and changing the winding so that these magnetos are now superior to last year's type.

Below is given a table of the principal dimensions of several of the new Herz Magnetos, these allowing comparison with other makes. In this comparison, nothing very weighty will be found against the Herz product, for they are smaller and lighter than most of the makes now on the market. Service in the past has proved that this design affords an effcient and powerful ignition means. Reports from manufacturers and users have shown that the results are very satisfactory.

This, taken in conjunction with the present-chronicled improvements, bids fair to make the coming year a very prosperous one for the house of Herz, particularly in sales of magnetos.

Dimensions of 5 M 4 & 6 magnetos, also 7 M 4 & 6:

Base, 4 3-8 in. long by 3 1-8 in. wide	5 1-4 in. by 3 1-8 in.
Extreme length, 8 1-2 in	9 1-4 in.
Base to end contact breaker cover, 1 3-8 in	1 3-8 in.
Base to driving end shaft, 2 1-2 in	2 1-2 in.
Base to end bearing box, 1 3-8 in	1 3-8 in.
Length shaft taper, 5-8 in	5-8 in.
Large diameter taper, .572 in	.572 in.
Small end taper, .473 in	.473 in.
Extreme width magneto, 4 3-8 in	4 3-4 in.
Height base to top magneto, 5 1-4 in	5 1-4 in.
Height base to top distributor and terminals, 8 3-4 in.	8 3-4 in.
Same, but without terminals, 7 1-4 in	7 1-4 in.
Height base to center shaft, 1 3-4 in	1 3-4 in.
Four hex. cap screws in base, 3-8 in. diam	4 3-8 in.
End of base to center of screw holes, 11-16 in	13-16 in.
Side of base to center of screw holes, 5-8 in	9-16 in.



Three Views of the 1910 Type of Herz Magneto, Improved and Known as Model 5 M 4

VOLTA MAGNETO PRESENTS MUCH REFINEMENT

ARC-FLAME describes the type of the Volta magneto, generating the high-tension current in the armature, without the aid of an external coil. The field magnets, armature, interrupter and distributor, broadly follow standard lines. Other desirable features are the ability to adjust the contact points without stopping the engine; instant accessibility and replaceability of the condenser, and a distributor arrangement which practically obviates the tendency to spark across from one segment to the next. A simple dual system, using the same distributor and plugs, with separate coil for battery use only, completes the list of the more important features of this magneto.

A study of the illustrations, Figs. 1, 2 and 3, will show how the above results are accomplished. The first and most noticeable feature is the location of the condenser 68. Instead of being mounted on the armature shaft behind the interrupter, it is separately contained in a water-tight box, held by one screw and a pin where it may be withdrawn in a moment and replaced by a new condenser, should that be necessary. The cover plate over the armature is permanently sealed, and the armature is therefore enclosed water-tight. Removing the condenser from behind the interrupter permits the high-tension collector ring 65-6-7 to take its place directly under the hard rubber distributor housing 18. The high-tension current therefore goes directly up by the carbon collector brushes 24, 25, to the distributor. The housing fits the casing 29 beneath it so closely as to prevent water from entering and causing an incipient short-circuit.

Fig. 1—Front view of Volta magneto

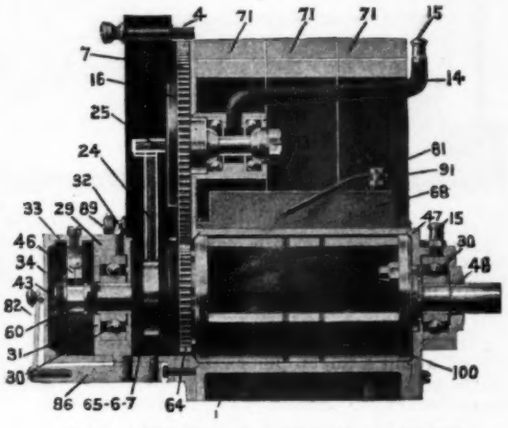


Fig. 2—Section on center line showing constructive details

ARMATURE SHAFT FLOATS ON BALL BEARINGS

Ball bearings 30 are of unusual size, and these bearings are separated by partitions from the rest of the mechanism. The oil cups 15, 32, deliver oil to the bearings, and drain outlets are provided underneath. Even that provision, however, would not be sufficient to prevent trouble from over-oiling were it not for the partitions just mentioned.

The interrupter, which is shown in Fig. 3, with the cover plate removed, differs from some other interrupters in that the cam itself rotates while the "breaker box" as a whole remains stationary. The cam, which is No. 60 in Fig. 2, is of hardened steel and runs against a steel roller 38. The contact screw 84 is stationary, and may be adjusted while the engine runs. The course of the primary current is through a central insulated wire passing through the armature shaft to the insulated button 43, through the flat spring 42 to the insulated mounting 36, thence from the contact arm to the grounded contact point 41. One of the binding posts 45 is connected to the condenser at 91, and the other connects with the ground switch.

The hard rubber housing 18 has no high tension contact segments. Instead, the rotating hard rubber disk 16 has a single T-shaped, inlaid brass segment, receiving current from the carbon brush 25. The cross bar of this segment travels around, making contact one at a time with as many carbon distributing brushes as there are cylinders. These brushes take the place of the usual stationary segments, and the brass segment takes the place of the usual distributing brush. The effect is to increase considerably the insulating distance from one collector brush to the next, since the brushes are much smaller than the usual segments. In this way arcing from one segment to the next is avoided. The clearance between armature and pole pieces is as small as accurate workmanship and due allowance for expansion from heat will permit. After being completely assembled the armature is brought to final size by grinding.

Extreme care is taken in the winding and insulation of the armature. An automatic indicator shows the condition of the insulation continuously while the winding is in progress, and if the wire breaks or a short circuit occurs the fact is shown instantly. After winding, the armatures are baked and lacquered in such a manner as to expel every particle of moisture.

The field magnets are imported, and before being used are aged to determine whether they hold their magnetism. After ageing, they are tested for magnetic strength, and if not up to the required standard they are remagnetized and aged again. If the second test shows them to be deficient they are rejected, unless so close to the standard that a second remagnetizing will save them. The material used in the magnets is a special mixture known to produce the best results from the point of view of magnetic density and retentivity. The magnets are aged so that the magnetic performance will be the same for several years of good service.

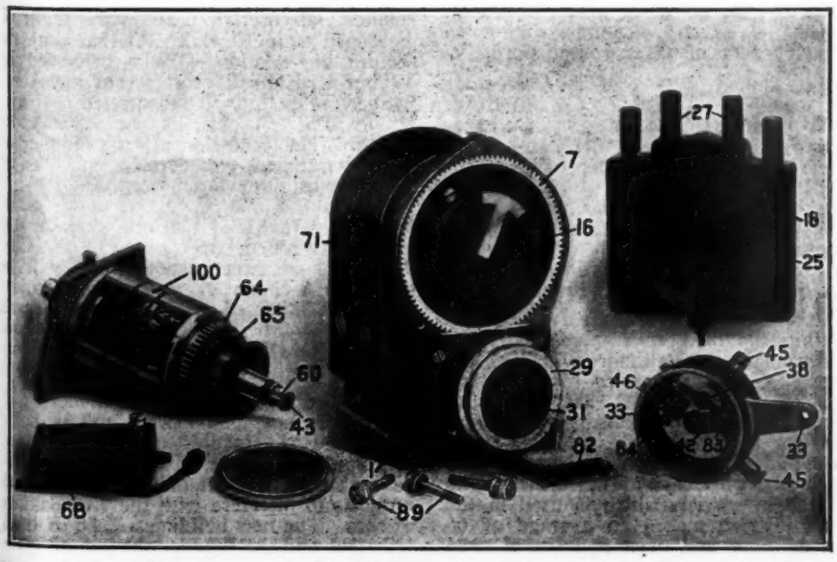


Fig. 3—Volta magneto partly dissembled showing groups or units of parts

Urban Scene in Which a Woods Electric Coupe Occupies the Foreground

Makers of electric cars in particular are wont to show their cars in scenes which suggest the comfort and refinement so characteristic of them. Here the Woods coupe, with its elegant lines and luxurious fittings, harmonizes perfectly with the entourage of the residential district in a Western city

Just forty years ago Dr. B. F. Goodrich moved about a dozen pieces of machinery from a half-successful rubber plant in New Jersey to Akron, O., locating on a small piece of ground which then cost $1,800. The machinery was all that was worth moving that distance. This meager outfit was put into a small brick building of two stories. This was the modest beginning of the first attempt to make rubber products in the United States outside of the Eastern and industrially established portion of the country. It was in 1880 that the business was incorporated under its present title, the B. F. Goodrich Company, with a capitalization of $100,000. Up to this time the output consisted of hose, belting, packing and moulded goods.

Shortly, the first factory enlargement was made at a small outlay. Then came another building and then another. Development was rapid. Buildings were added every year. The B. F. Goodrich Company now covers twenty acres with twenty-three acres of floor space and employs 5,000 men. From the modest start in 1870 the resources have grown to over $10,000,000 from its earnings alone.

Postmaster David C. Owen, of Milwaukee, Wis., originator of the idea of using automobiles for transportation of the mails, was in Washington, D. C., last week to report on the results obtained during the third year of this venture in Milwaukee. The general report issue by First Assistant Postmaster-General Grandfield shortly afterward, based on results in Milwaukee Washington, Boston and Indianapolis, is highly favorable to the automobile system. For the Milwaukee system the Johnson Service Company built four special-body cars, with steam power to start with, and this number has been increased to 14 for Milwaukee alone. Gasoline motors are used in the later models.

Among patents recently granted to Milwaukee inventors is one to George L. Odenbrett for a self-starter device for gasoline engines. It will be recalled that Mr. Odenbrett was killed by an explosion of a gas recharging tank in Milwaukee last November. He was probably the original automobilist of the Northwest and ranked high as an inventor. He perfected the self-starting device only a short time before his death. Manufacturers who investigated it had much faith in the device and gave Mr. Odenbrett much encouragement. W. C. Westaway, of Beloit, Wis., is another Wisconsin inventor who has just been granted patents on an ignition device.

The Excelsior Express & Standard Cab Company is about to enter the taxicab business in Pittsburg. It has purchased 20 four-seated, 20-horsepower taxicabs from the Atlas Motor Car Company, of Springfield, Mass., and service will be started in this city February 1. The company's offices will be at 1127-1133 Liberty avenue, opposite the Union Station, and its garage will be at 1133-1145 Liberty avenue. It will establish waiting points at the railroad stations, and will also have direct private telephone communication with the leading hotels. The officers of the company are: President, William H. Keech; vice-president, J. D. Callery; general manager, Joseph Ford.

At an annual meeting of the Swinehart Clincher, Tire and Rubber Company, W. W. Wuchter was elected president, succeeding J. A. Swinehart, the latter being elected vice-president. Other officers are: C. O. Baughman, secretary, and R. A. May, treasurer. Frank R. Talbot was elected to the board of directors to succeed J. O. Surbey. The rest of the board is as follows: Frank B. Theiss, William Byrider, R. A. May, Joseph Dangel, Frank R. Talbot, J. A. Swinehart and W. W. Wuchter.

Within the next four months the police department of Baltimore will have five automobile patrols in service, for the Board of Police Commissioners has placed an order with Callahan, Atkinson & Co., local agents for the Locomobile, for three more four-cylinder, 60-horsepower cars. These cars have a wheelbase of 148 inches. The first one in service, which is used in the central district, makes an average of 60 miles an hour and over, and has climbed high hills at a 40-mile rate.

During the recent snow in Columbus, Ohio, J. Shrum rigged up a motor sleigh which attracted much attention. It was made out of an ordinary sled, equipped with a third runner for steering and with a circular saw, which furnished the motive power in connection with an automobile motor. By an ingenious contrivance the circular saw was so fixed that by a lever it could be raised and lowered, thus adjusting it to the unevenness of the surface of the snow and ice.

It is said that the American Locomotive Company will greatly enlarge its automobile manufacturing department at Providence, R. I., and that it was recently decided to expend half a million dollars for this purpose. A portion of the appropriation will go for new tools and machinery and the balance toward the erection of new buildings. With these facilities this company will be able to double their output of Alco cars.

Indiana, Illinois and Wisconsin are after the Cobe trophy race for 1910. The initial contest at Crown Point, Ind., proved profitable, and the Indiana people feel that it will be hard to find a better circuit. W. C. Moore, president of the Wisconsin State Automobile Association, has a scout car out on the roads near Racine and Lake Geneva, and Frank B. Wood, strong for the Illinois course, announces that he has a circuit admirably suited for road racing.

The Racine Mfg. Co., of Racine, Wis., is now employing 50 per cent. of the total number of workmen in the big shops before the disastrous fire of December 12, which wiped out the buildings. As fast as new machinery can be installed in temporary quarters more skilled men are engaged. It is now definite that the company will remain in Racine, as business men and manufacturers have subscribed enough money to warrant an early start on the buildings.

New contracts will be let in Los Angeles, Cal., for the carrying of the United States mails in automobiles. These will conform closely to the regular screen wagons, of such style and construction as may be acceptable to the department. Each proposal must be accompanied with a statment naming the kind of vehicle to be used, giving a detailed description of the motor and wagon, and also the speed limit permitted for such vehicle in Los Angeles.

The house committee of the New Jersey Automobile and Motor Club will hold a smoker and entertainment on the night of February 10 in Newark. At that time the lecture on aviation will be delivered by Wilbur K. Kimball, secretary of the Aeronautic Association. It is expected that aviation will find the place as a branch of sport with this club, and that a large number of present members will enroll themselves as members of the aviation section.

E. Planche and C. Morel have established a garage and machine shop at 126 East Fifty-fourth street, New York City. All kinds of experimental work will be handled. A special repair-shop department will be maintained with the best French mechanics. Mr. Planche has been connected with the Walter Automobile Company as designer and superintendent.

Hartford is to have another modern garage. It is now under way, and is being built for E. J. Hoadley, on Hoadley place. The building is to be 46 x 90 feet, and will have about 4,000 feet of floor space, with no posts to interfere with the free passage of cars. The new building will be of brick and steel, and the foundations will be made sufficiently heavy to permit of additions.

Yielding to the protests of automobile manufacturers, the projected advance on freight rates which was to have been made by a transcontinental line will be held in abeyance until the next meeting of the Trans-Continental Freight Bureau. This decision means that the rates will remain at $3 per hundred pounds, or about $360 per carload. The increase ordered at a recent meeting would have raised the charge 33 1-3 per cent.

Wisconsin automobile manufacturers have been experiencing great difficulty in their testing divisions because of the heavy snows, general throughout the State of the last two weeks. The snows are the heaviest since 1881. The snow storms, however, have given splendid opportunity for unusual service tests, although under discomfort to the men at the wheels, who go forth with picks, shovels, chains, etc., for emergencies.

It is said that the American Automobile Company, Toledo, Ohio, has purchased Glidden Tour with another one, in which a perfect mechanical and road score will be rewarded with a certificate, and, while no announcement has been made, it is believed that this year the race will be through the Southland, where there is a rapidly developing market for low and medium-priced cars.

St. Louis has a new type of "rubberneck" wagon which has just been placed in commission by the "Seeing St. Louis" Automobile Company. The car is completely inclosed, insuring comfort during the cold weather, and also affording passengers a good view of the sights. Its carrying capacity is twelve persons, while the driver's seat provides for four additional ones.

Reports from San Francisco indicate that the hay market of that city is being seriously affected through the rapid increase in the number of automobiles, both of the pleasure and trucking classes. Livery stables and carriage companies claim to feel the passing of the horse, and one large carriage company was sold at auction because it could no longer make business pay.

George W. Armstrong, a member of the Board of Commissioners of Spokane, believes that the city should adopt auto fire apparatus and will advocate the change, saying that the cost of maintenance is much less than that of horses and wagons. Mayor N. S. Pratt and other officials look with favor upon the plan, and it is likely that it will be brought to a successful conclusion.

The latest thing in Indianapolis is a motor ambulance which, to all outward appearances, is but an elegantly appointed limousine pleasure car. A double floor eliminates all sound of the machinery while the patient is in the car, and, having all the outward earmarks of an ordinary car, the machine avoids arousing the morbid curiosity of street crowds.

A Hupmobile, driven by C. Z. Salling, covered the desert between Los Angeles, Cal., and Phoenix, Ariz., in 27 hours 40 minutes. The distance is 481 miles, a great part of it being heavy going on account of sand, and, owing to the isolated character of the road, it was impossible to secure supplies of any sort during the trip. All were carried on the car.

Chief Grant, of the fire department of South Bend, Ind., in his annual report renewed his request for an automobile chemical engine for the department. He recommends the purchasing of an automobile chemical engine equipped with two 60-gallon tanks and two sets of 1-inch hose, so that two leads could be worked at one fire.

"The Firestone Trio" is the title of a handsome art panel calendar which is being sent out to the trade by the Firestone Tire & Rubber Company, Akron, Ohio. It is 16 1-2 x 34 1-2 inch in size, lithographed in twelve colors, and has a large calendar pad, making it especially suitable for garage, salesrooms and office use.

In the future all automobiles owned by the city of Cleveland, Ohio, will be painted bright yellow with blue trimmings. It is expected that this striking and distinctive coloring will serve to give city cars a right of way, and, in addition, it may prevent unauthorized pleasure excursions and joy rides.

It is reported that plans are well under way by the Mitchell Motor Car Company for beginning the work of manufacture of taxicabs. According to Superintendent J. Bate, specifications for a taxicab which will attract considerable attention will shortly be made.

The "Flag to Flag" automobile contest and international event for motor cars and motor cycles will this year be run from Denver to the City of Mexico. The Wahlgreen trophy will be given the winner. The run will be carried out along the lines of the Glidden tour.

At a recent meeting of the Goshen, N. Y., Board of Trade it was decided to develop a Coates-Goshen automobile, and $150,000 was subscribed by individual members of the Board for a new factory, which will have an output of 150 cars a year.

A number of business men in Carlisle Pa., have announced that they are about to establish an up-to-date garage and auto business. They will not only cater to the local trade, but will also have branches in several other towns and cities.

The board of trade in Little Rock, Ark., is backing a movement to convert the Clinton Park tract in that city into a speedway. The plot contains 106 acres, and, by incorporating a loop, a course 3 1-2 miles in length can be laid out.

The motorists of Texas have organized a State association and are now pushing a campaign for membership. Indications go to show that this association will become powerful among the automobile bodies of the country.

It is said there will be erected and made ready for use at the next Lakewood, N. J., season an automobile racing course which will cost at least $500,000. The course will be 8 miles in length and complete in every particular.

The Mitchell old model automobile, which was commandeered in San Francisco by General Frederick Funston at the time of the earthquake, is still doing service in that city, and bids fair to last many years.

Matt Weber, of LaCrosse, Wis., and A. J. Frogue, of Kansas City, Mo., have been granted patents on a tireless wheel for automobiles, based on the internal spring principles. Spokes are interchangeable.

The Monon Railroad Company will build an immense shed at Louisville, Ky., for the purpose of loading and unloading automobiles. Plans for the construction have already been drawn.

The Ohio State Highway Commission has filed estimates for the needs of the department for road improvement for 1910. It asks for $880,000, or $10,000 for each of the 88 counties in the State.

It is reported in Syracuse, N. Y., that an automobile stage route will be established between Seneca Falls and Ovid. A passenger and express service, it is said, would pay.

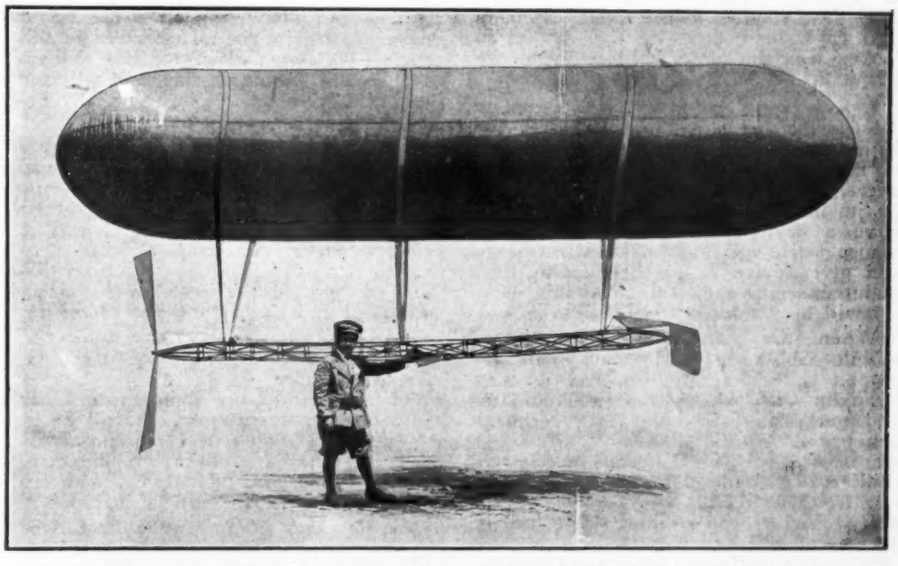
A recent chauffeur strike crippled the Brooklyn, N. Y., Taxicab Company and left that borough taxiless for quite a while.

The People's Natural Gas Company, of Wilkinsburg, Pa., has purchased a heavy motor truck for its deliveries.

COMING PHILADELPHIA AUTO EVENTS

The Quaker City Motor Club, of Philadelphia, is planning a number of events which, from a social and racing standpoint, will probably eclipse the efforts of 1909.

The racing factors for this year will include the famous Fairmount Park race, several track meets, road-ability running, and other events to be decided on later. Track meets are booked for June 4 and August 6. They will be held at Point Breeze track. The Fairmount Park race will be held October 8.



Model of Dirigible Balloon Which Uses Hartford Rubber Company's Fabric

The dirigible is the work of a youthful resident of Hartford who gives promise of becoming a notable inventor. Although hardly of man-carrying size, or even of a size to carry its constructor, it can travel at fairly good speed and is readily controlled from the ground

Packard Testers Snow-Bucking on Grand Boulevard, Detroit

The recent heavy snowfall blocked the streets, and it was necessary to clear some of them immediately so that the fire department might not be hampered. In this work the ubiquitous testers made themselves of great service

The Love Garage Company, of Columbus, Ohio, a new corporation which handles the White, both steamer and gasoline, and the Cole "30" in central Ohio, has moved into the new building which was built especially for a sales agency and garage. The structure has two floors, with a total of 15,000 square feet of floor space. James P. Love is president; Fred E. Love, general manager, and M. L. Love, secretary and treasurer. C. W. Cain, formerly with the American Auto Company of Columbus, becomes sales agent for the Love company.

One hundred and eighty dealers of the Pence Automobile Company, of Minneapolis, Minn., operating garages throughout Minnesota, North and South Dakota, and Montana, paid a visit to the plant of the Buick Motor Company, at Flint, Mich., at the opening of the new year. The trip was made in a train of nine Pullman cars, and two days were spent by the visitors in looking over the works and in enjoying the hospitality of the Buick Motor Company.

A large repair shop will be opened in Boston by the E. R. Thomas Motor Co. This company is realizing that any car, no matter how well it is cared for, needs occasional adjustments and repairs, and so its building on Stanhope street will have a corps of expert mechanicians whose duties will be to make adjustments and give advice as to the running and maintenance of cars. Much of this service will be rendered free of charge.

When the Salt Lake City Automobile Show is held there will be among the exhibits a six-cylinder Franklin with which George T. O'Dell and party at Salt Lake City recently penetrated some of the coldest recesses of the Alps. It is said that in the chilliest of altitudes the car had no freezing trouble. With this car the same party climbed to within a mile and a quarter of Mt. Vesuvius.

Within the past 60 days the Simplex Motor Car Company, of Mishawaka, has added $60,000 worth of new machinery to its plant in order to take care of the orders ahead for its product. It is the intention of the company to turn out 350 complete cars in the next year, as compared with 100 last year. Salesrooms have been opened in New York City at Broadway and Fifty-eighth street, in charge of S. J. Wise & Co.

A partial reorganization of the Smith Automobile Company, Topeka, Kan., has been completed and an additional working capital of $100,000 provided to enable them to take care of the demand for cars. The new officers are O. H. L. Wernicke, Grand Rapids, Mich., President, succeeding Dr. L. Anton Smith, retiring. Walter L. Smith will take care of the distribution.

The New York Mica & Mfg. Co. recently purchased the plant and equipment of the Auburn Mica Company, of Auburn, N. Y., and will make a specialty of mica spark plugs. The new plant is the largest in the country for the manufacture of this article. The company will continue to manufacture the "Auburn" plug, and will add the "Wright" aviation plug especially designed for aeronautical motors.

In order to satisfy himself that the Moon "30" is as powerful on the road as under dyanmometer tests in the factory, Stewart MacDonald, vice-president of the Moon Motor Car Company, drove a $1,500 car from St. Louis to Washington, Mo., and back, a total distance of 150 miles. The test was entirely successful and not a tool was touched.

The Rainier Motor Company, holders of the $10,000 trophy, will place it on exhibition in a selected list of cities in which the feat of the Rainier stock car has created most interest. It will be in the custody of two attendants and a representative of a well-known detective agency. Boston, Philadelphia, Chicago and other large cities will be included.

The Hartford Automobile & Boat Supply Company has filed a certificate of incorporation with the Connecticut Secretary of State. The purpose of the concern is to manufacture and sell automobiles and motor-cycles. The capital stock is $50,000, of which $4,000 is paid in. The incorporators are T. Edward Oakes, William J. Rabbitt and Geo. J. Stoner, of Hartford.

The Boston Offices of the United Vehicle Company have been removed from State street to 107 Massachusetts avenue, this latter address to be the local headquarters of the concern. The company has purchased a factory at Woodville and will erect new buildings to be used as factory offices. The product of their plant will be known as United trucks.

Fourteen carloads of steel for the new plant of the Corliss Motor Co., of Corliss, Wis., the $1,000,000 concern formed to produce the former Owen Thomas Six, have already arrived at Corliss and several carloads are coming daily. The owners of the company are also proprietors of several big steel mills in the vicinity of Pittsburg.

It is stated that plans have been completed for an up-to-date garage to be built by H. W. Brown on Water street, Albany, N. Y. It is estimated that 100 cars can be accommodated on the ground floor. The second floor will be divided into sales and storage rooms, while arrangements will be made on the roof for the landing of airships.

The Public Automobile Service Corporation has filed articles of incorporation at Newark, N. J. Its object will be to operate a taxicab service wheresoever it is required. Wm. R. Buehler, of New York, is said to be the principal incorporator, while Chas. E. S. Thorn, of Newark, N. J., is mentioned as the local agent.

A new car is to make its appearance in Pittsburg, Pa., in the shape of the Ohio "40," made by the Ohio Motor Car Company, of Cincinnati, Ohio. The new machine is to be handled by the Park Automobile Company. The company was recently reorganized by J. C. Armour, H. G. Knapp and Major A. G. C. Quay.

A new firm in the automobile world of Syracuse this season is that of Morrison & Smith, Syracuse, N. Y., who have opened an agency at 109 South State street, where the National and the Palmer-Singer may be seen. Charles J. Roehm, who for some time has represented the National, has taken up work for the new firm.

The Continental Caoutchouc Company is offering a dual demountable rim on which two pneumatic tires are fitted, making four tires on the rear wheels. These rims are designed for heavy trucks and commercial cars. This rim affords quick tire changes and any style clincher tire can be used on it.

The Buick Motor Company, Flint, Mich., has filed articles of incorporation and a statement to do business in Wisconsin. The capital stock is given at $500,000. This is the formal step necessary to the establishment of a branch in Milwaukee. George P. Hewitt, Matthews building, is the manager.

Carson, Pirie, Scott & Company have decided to use the Rapid automobiles for the transportation of goods from warehouse to delivery stations. This firm has already received three 3-ton trucks; more trucks of this type, as well as several 1 and 2-ton wagons, are scheduled for future delivery.

C. Roy Clough, manager of the Columbus, Ohio, branch of the Charles Schiear Motor Car Company, has placed the following sugabencies in Ohio for the Hupmobile: Kenton Auto and Electric Company, Kenton; Walter W. Wood, Marietta; Fritz Bros., Zanesville, and Fritz Bros., Cambridge.

The Pittsburg Automobile Company, now capitalized at $50,000, which has removed to Baum street, East End, has leased its former location at Seventh avenue and Grant boulevard to Leo Kaufman, who will conduct a large establishment in auto supplies and auto oils.

The Richards Iron Works at Manitowoc, Wis., is experimenting in the manufacture of motors for commercial and pleasure vehicles, and on the success of the experiment depends the matter of the establishment of a large plant for the construction of complete cars and trucks.

The first automobile ever made in Findlay, Ohio, will be ready for inspection about March 1. It is now being assembled in the Findlay Carriage Company plant. The car will be a five-passenger with a 124-inch wheelbase of 55 horsepower, and with a speed limit of 60 miles an hour.

The Eastern Automobile Company, of Bangor, Me., will open a new sales, storage and repair room, conducting a regular garage business and handling accessories for the wholesale and retail trade. The Oldsmobile, Oakland, Overland and Buick will be represented.

The Francisco Motor Car Company, Columbus, organized recently to take the Central Ohio agency for the Ohio, has located an office at 338 North High street. A salesroom will be leased later. The company is a partnership, consisting of J. B. and C. M. Francisco.

The E. M. F. car will be represented in Indianapolis by the Reliable Auto Exchange, of 820 East Washington street. The company has obtained an option on a salesroom on Massachusetts avenue, and will probably occupy the new quarters in the near future.

Harry B. Sims has been appointed sales agent for the Charles S. Schiear Motor Car Company in Columbus, Ohio. He will pay particular attention to the Hupmobile and Velie lines. Mr. Sims was formerly secretary of the Columbus Automobile Club.

The Bellevue Automobile Company has been formed by George J. Kurtz, J. H. Ehrhardt, Alton Hamilton, William Bittel and Louis Appel, and will start in business at once in Bellevue, Pittsburg's most aristocratic North Side suburb.

The Bruck Automobile Selling Company, Trenton, N. J., has been incorporated with a capital of $30,000. The incorporators are Norman P. Bruck, Edwin H. Steel and Levy H. Drisdon. This company will conduct a general automobile business.

The Empire Tire Company, of Trenton, N. J., has secured the service of J. M. Shackleford, who will manage the New York uptown branch at 73d Street and Broadway. Mr. Shackleford succeeds Marcus Allan, recently resigned.

The Crest Motor Car Company, Cleveland, Ohio, is to handle the new Warren car, manufactured in Detroit, Mich. The company is to open up headquarters on Euclid avenue, under the management of Messrs. Bunnell & Bishop.

The Mauser Auto-cab Company has been incorporated in Youngstown, Ohio, to do general taxicab and motor business. According to A. E. Elkins, who is to be manager of the company, a line of Cadillac taxicabs will be used.

The Colorado Studebaker Vehicle Company, of Denver, has a salesroom which is said to equal the best salesroom in the United States in appearance and lighting. It is one of Denver's show places.

The Cumberland Garage, of Brooklyn, will handle the Speedwell and Velie cars in that city. The garage company is composed of Alfred Witmarth, ex-president of the Long Island Automobile Club, and W. L. Gray.

The Thomas Company have established a direct branch of their business in Boston. C. S. Henshaw is the Eastern manager. This concern is located in the Back Bay section.

C. M. Blair, of Bartlett, Texas, will in the future handle the Great Western "30s" exclusively. William M. Crow, Millersburg, Ohio, will handle this same car in Holmes County, Ohio.

The Standard Motor Car Company, of 614 North Broad street, has just made a contract with the Velie Motor Car Company, of Moline, Ill., to handle the Velie in the Quaker City.

C. H. Davis, a well-known automobile man, of Alameda County, has been appointed agent for the Cartercar Automobile Company in this city, and is shortly to establish headquarters on 12th street.

PERSONAL TRADE MENTION

George Robertson spent a busy day last week at the factory of the Parry Auto Company at Indianapolis, for which he is the New York agent, in association with H. C. Mergenthaler. He made a careful inspection of the Parry models under the various stages of construction, and expressed himself as well pleased. The Parry plant is now working 600 men and turning out on an average of 18 cars a day.

A. R. Van Antwerp has become president of the Van Automobile Company, of St. Louis, vice C. F. Lorenz resigned. C. E. Darrow will be associated with the company as secretary and treasurer. Don A. Livingston will remain as head salesman, and C. E. Weaver, foreman of the garage, will be retained.

George W. Demack, who has been connected with the Revol Company, New Orleans, La., is planning to go into business on his own account. He has already selected a site for his building, and work is to commence shortly on the erection of a first-class garage and repair establishment.

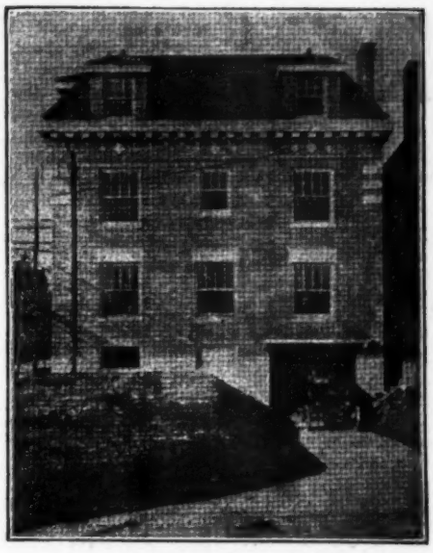
George L. Dorr, president and manager of the United Motor Company Agency for the American and Sterling cars, has leased quarters in New York for an Eastern branch of the concern. This concern has contracted for the entire output of the Sterling. They have placed 61 agencies.

W. H. Dotzaur, of Ilion, N. Y., has been appointed superintendent of the automobile hub department of the Weston-Mott Company, of Flint, Mich. Mr. Dotzaur has been connected with the Remington Arms Company in various capacities for several years.

H. C. Gottfried, manager of the General Motor Car Company, St. Louis, has sold his interest in the concern to J. H. Hutchison and S. H. Kohn, stockholders in the company. This leaves the two latter named in full control of the concern.

W. F. Plastine, of Seattle, Wash., has been appointed manager of the electric sales and garage business of the Studebaker Automobile Company. He was formerly with the Baker Motor Vehicle Company of Cleveland, Ohio.

J. N. Willys, of the Overland Automobile Company, Toledo, Ohio, has purchased the Payne shops in Elmira, N. Y. The plant is to be devoted to the manufacturing of various parts for the Overland cars.



Combined Residence and Garage

Dr. R. Y. Henry's new home on South Grand avenue, St. Louis, has a garage in the basement, thus solving the garage problem once and for all. In the photograph the doctor is shown driving out in his KisselKar

C. F. Frith and Charles G. Short, formerly of Wamego, are to go into the automobile general garage business in Topeka, Kan. Work has been commenced on the erection of an automobile plant.

MANY NEW CONCERNS IN OHIO

COLUMBUS, O., Jan. 25—A number of new concerns have been organized in Columbus to act as agents for cars and to do a garage business. The Francisco Motor Car Company will handle the Ohio and will be at 338 N. High st.

The Ohio Auto Company has been incorporated with a capital stock of $20,000 to take over the garage business of R. L. Patterson at 121 South Third street. Mr. Patterson recently purchased the business from F. H. Lawell. The incorporators are R. H. Kissinger, F. S. Armstrong, R. L. Patterson, Kerr R. Hosey and Theodore A. Patterson.

The Spangler Automobile Company of Circleville, Ohio, was incorporated with a capital of $10,000 by William I. Spangler and others to operate a sales agency and garage business at that place.

The Cleveland Speed Indicator Company was incorporated recently with a capital stock of $5,000 by William H. Marlatt and others to manufacture a speedometer.

The Booth Dismountable Rim Company of Cleveland was incorporated with a capital of $50,000 by W. N. Booth and others to establish a plant for the manufacture of auto rims.

E. H. Huffman, who has been conducting an implement store at 114 East Town street, Columbus, has taken the Central Ohio agency for the International Automobiles and also the commercial car manufactured by the International Harvester Company. The concern will sell roadsters and light delivery wagons.

G. D. Wilson, of the Norris-Toledo Motor Sales Company, of Toledo, has placed the Central Ohio agency for the Parry car with E. C. Barr, Columbus, who has been operating a supply store and motor cycle agency under the name of the Franklin Cycle & Supply Company. He now has the Parry and Demot cars.

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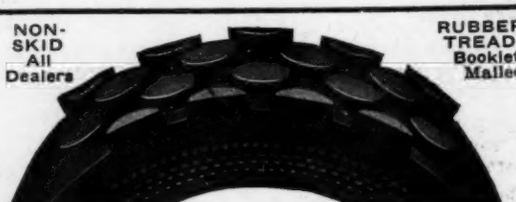

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